

Journal of Mycology

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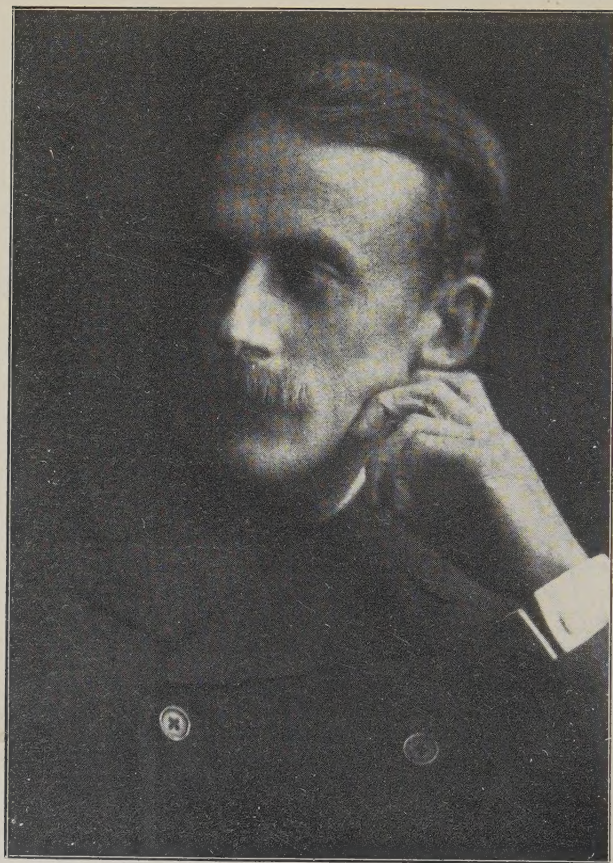
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NORTH AMERICAN SPECIES OF *LEPIOTA*.

BY A. P. MORGAN.

(Concluded from page 203.)

VIII. HIATULOIDES. *Pileus* submembranaceous, thin, soft and flexible, umbonate; the flesh well nigh obsolete except beneath the central disc; the dermis radiately fibrillose and plicate-sulcate often to the umbo; the cuticle separating into scales. Stipe slender and sometimes much elongated, fistulous and fragile, subglabrous; the annulus thin and membranaceous.

A tribe of many species taking its name from *Lepiota hiatuloides* Speg. Like the genus *Hiatula* to which it is related, its members abound in tropical regions; in colder climates some of them appear in greenhouses, on hot beds and in similar situations.

a. *Pileus* white with pallid or brownish scales.

60. *LEPIOTA FARINOSA* PECK, 43 N. Y. REP. 1889.

Pileus submembranaceous, oblong-ovoid then campanulate and expanded, umbonate, the dermis white beneath the cuticle, flocculose-farinaceous, plicate-sulcate around the margin; the cuticle thin, whitish or pale alutaceous, at first continuous, very soon separating into small scales except upon the umbo, which at length are widely scattered and deciduous. Stipe tapering upward from a clavate base, more or less elongated and flexuous, hollow, white, subglabrous; the annulus a thin membrane, subsistent. Lamellae rather narrow, close, free, white; spores elliptic-ovoid, sometimes oblique, 8-10 x 5-7 mic. uniguttulate.

Caespitose; growing on old manure heaps, in the rich soil of gardens, etc. Boston, Mass., *Forster*; Preston, O. Common

and abundant. Pileus 5-8 cm. in diameter; the stipe 6-10 cm. in height, 3-5 mm. thick at the apex and 7-12 mm. thick below. Probably confused generally with *Lepiota cretacea* from which it seems to differ chiefly in the pale color of the cuticle.

61. *LEPIOTA MASTOIDEA*. *AGARICUS MASTOIDEUS* FRIES, SYST. MYC. I. 1821, BASED ON A FIGURE AND DESCRIPTION OF BATTARRA, FUNGI ARIM. 1755; A. (*LEPIOTA*) *SUBREMOTUS* B. & C., ANN. AND MAG. N. H. 1859.

Pileus submembranaceous, at first elliptic-ovoid then campanulate and explanate, abruptly umbonate; the dermis radiately fibrillose, plicate-sulcate around the margin, beneath the cuticle snow-white; the cuticle whitish or drab, gradually separating into minute scales and warts, except upon the umbo. Stipe tapering upward from a bulbous base, slender, fistulous, whitish, subglabrous, the annulus thin, membranaceous. Lamellae rather narrow, close, white, free and remote from the stipe; spores elliptic-ovoid, $7-9 \times 5-6$ mic., uniguttulate.

Subcaespitose; growing in rich soil about old stumps in woods. New England, *Sprague*: Miami Valley, O., *Lea, Morgan*. Pileus 6-8 cm. in diameter; the stipe 7-10 cm. in length, 3-4 mm. thick at the apex and 5-8 mm. thick at the base. Mr. Lea's specimens were found at Waynesville; my figures were made in Dayton (1878); I have specimens collected about Preston; so the plant is an undoubted native to this region. A. (*Amanita*) *umbonatus* Schumacher, En. Pl. Saellandiae, the pileus furnished with brownish scales, is described by Berkeley and figured by Cooke under the name *Agaricus mastoideus*. *Lepiota subremota* "entirely yellow or white," Bull. Cornell University, Vol. III. No. 1, should have had another name and been described.

62. *LEPIOTA RUGULOSA* PECK, BULL. TORR. CLUB, 1900.

Pileus submembranaceous, broadly convex or nearly plane, umbonate; the dermis radiately fibrillose, plicate-rugulose, all white, the cuticle at length breaking up into minute fibrous scales. Stipe slender, nearly equal, fistulous, rufescent beneath the white silky-fibrillose cuticle; the annulus membranaceous, subpersistent, white. Lamellae narrow, close, free, white; spores elliptic-oblong, $6-8 \times 4-5$ mic.

Growing on the ground in woods. Washington, D. C., *Mrs. Williams*; Preston, O. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and 2-3 mm. thick. I find this among undetermined specimens of 1896; it makes beautiful specimens; my notes do not add much to Prof. Peck's description.

63. *LEPIOTA CRETACEA*, *AGARICUS CRETACEUS* BULLIARD, HERB. FR. PL. 374, 1787, *AGARICUS CEPAESTIPES* (IN PART) SOWERBY, ENG. FUNGI, 1797; COOKE, ILLUSTR. PL. 942; PECK, N. Y. REP. 1882 AND 1904; *LEPIOTA MAMMAEFORMIS* UNDERWOOD, BULL. TORR. CLUB, 1897.

Pileus submembranaceous, at first subovoid with an obtuse apex, then campanulate and expanded, umbonate; the dermis white beneath the cuticle, densely flocculose-scaly and farinaceous, plicate-sulcate around the margin; the cuticle thin, brownish, darker on the umbo, very soon separating into minute scales which are more or less deciduous. Stipe arising from a more or less elongated and thickened base, tapering upward, flexuous, hollow, white, subglabrous; the annulus thin, membranaceous, subpersistent. Lamellae rather narrow, close, free, white; spores elliptic-ovoid, 8-10 x 5-7 mic.

Caespitose; growing in the rich soil of gardens, hot beds, etc. Probably common in such situations throughout the country. Pileus 5-10 cm. in diameter; the stipe 8-16 cm. in height, 4-6 mm. thick at the apex and 1-2 cm. thick at the base.

64. *LEPIOTA NICTOPHILA* ELLIS, BULL. TORR. CLUB, 1874; SYLLOGE V. 50.

Pileus fleshy, cylindraceous-hemispheric then convex or concave, broadly umbonate; the margin sulcate-striate, the striae at length reaching nearly to the center; the cuticle at first continuous, black, soon breaking up into small scales which are scattered over the surface. Stipe slender, fistulous, fibrous-stuffed, farinaceous-scaly, ornamented above the middle with an annular band, marked around the base by a black line. Lamellae rather close, whitish, rounded behind and free; spores oblong, about 5 mic. in length.

Subcaespitose and furnished with an abundant white mycelium. Newfield, N. J., *Ellis*. Pileus 2-3 cm. in diameter, the stipe 2-3 cm. in height.

65. *LEPIOTA LONGISTRIATA* PECK, BULL. TORR. CLUB, 1898.

Pileus submembranaceous, convex or nearly plane, umbonate; the dermis radiately fibrillose, striate nearly or quite to the umbo; the cuticle grayish or brownish, broken up into small fibrous scales. Stipe tapering upward from a thickened base, slender, fistulous; the annulus delicate, evanescent. Lamellae narrow, close, free, whitish or yellowish; spores elliptic, 6-8 x 4-5 mic.

Growing in rich soil in gardens. Alabama, *Earle*. Pileus 3-5 cm. in diameter, the stipe 5-8 cm. long and 2-6 mm. thick.

66. *LEPIOTA EARLEI* PECK, BULL. TORR. CLUB, 1898.

Pileus submembranaceous, broadly convex or nearly plane, umbonate; the dermis radiately fibrillose, white beneath the cuticle, the margin striate and somewhat lacerate; the cuticle at first brown and continuous, at length separating into minute scales except upon the umbo. Stipe tapering upward from a thickened base, slender, hollow, fibrillose, reddening where bruised. Lamellae close subventricose, free, white; spores elliptic, 10-12 x 6-8 mic.

Caespitose; growing in newly cleared land. Alabama, *Earle*. Pileus 5-7 cm. in diameter, the stipe 5-7 cm. long and 4-6 mm. thick. "A very pretty and delicate species." It is smaller than *Lepiota Americana* and has larger spores; the change in color is limited to wounded places.

b. Pileus white with yellow or all yellow.

67. *LEPIOTA LUTEA*, *AGARICUS LUTEUS* BOLTON, HIST. FUNG. 1788; WITHERING, BRIT. PL. IV, 233; COOKE, ILLUSTR. PL. 5.

Pileus submembranaceous, at first subovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, plicate-sulcate around the margin, yellow, the cuticle separating into small scales scattered upon the surface. Stipe elongated, slender above the more or less elongated and inflated base, fistulous, yellow, subglabrous; the annulus thin membranaceous. Lamellae rather broad, subdistant, yellow, free; spores elliptic, 7-8 x 4-5 mic.

Growing in green houses, Columbus, O., *Kellerman*. Pileus 3-6 cm. in diameter; the stipe 6-10 cm. in length, 3-5 mm. thick at the apex and 6-10 mm. thick at the base. The specimens I have seen are pure yellow throughout; it is probably not uncommon in green houses everywhere.

68. *LEPIOTA SPECTABILIS* CLEMENT, BOT. NEB. III, 1894.

Pileus submembranaceous, convex and explanate with a smooth depressed disc, the dermis radiately fibrillose, pale sulphur-colored, the surface pulverulent, striate or sulcate around the margin. Stipe tapering upward from a strongly thickened base, minutely scaly above the annulus, below it glabrous, colored as the pileus; the annulus straw-colored persistent. Lamellae narrow, close, yellowish, remote from the stipe; spores ovoid, 5-6 mic. in diameter, uniguttulate.

Growing in a green house, Lincoln, Neb., *Clements*. Pileus 2-2.5 cm. in diameter; the stipe 3-4 cm. long, 3 mm. thick above and 7-8 mm. below.

69. *LEPIOTA FRAGILISSIMA*, *HIATULA FRAGILISSIMA* RAVENEL, IN BERKLEY'S CENTURIES OF N. A. FUNGI, ANN. & MAG. N. H. 1853.

Pileus membranaceous, very thin and fragile, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, white beneath a yellow pulverulence, plicate-sulcate and rimulose. Stipe arising from a somewhat bulbous base, slender, elongated, fistulous, fibrous-stuffed, very fragile, yellow, with a white mycelium at the base; the annulus movable. Lamellae white, thin and membranaceous, rather distant, obtuse behind and remote from the stipe; spores obliquely elliptic, rather large.

Solitary or gregarious; growing on earth and decayed vegetables on the margin of swamps. S. Carolina, *Ravenel*. Pileus 5-8 cm. in diameter, the stipe 10-15 cm. in height.

70. *LEPIOTA SULPHURINA*, *MASTOCEPHALUS SULPHURINUS* CLEMENTS, BOT. NEB. IV, 1896.

Pileus submembranaceous, campanulate then convex, umbonate; the dermis radiately fibrillose, sulphur-yellow, torn into crowded, oblong or elongate scales, plicate-sulcate around the margin; the umbo glabrous, incarnate-brick-colored. Stipe arising from a bulbous base, tapering upward, fistulous, pruinose, at the base yellow-floccose, isabelline above; the annulus membranaceous, sulphur-yellow, lacerate. Lamellae linear, crowded, adnexed, white or pale straw-colored; spores elliptic-ovoid, 7-9 x 4-5 mic. uniguttulate.

Growing on the ground. Nebraska, *Clements*. Pileus 1.5-3 cm. in diameter; the stipe 4 cm. long, 3-4 mm. thick above, 6-7 mm. below.

71. *LEPIOTA FLAVESCENS* MORGAN SP. NOV.

Pileus submembranaceous, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, becoming scaly, sulcate nearly to the center; pale yellow, fulvescent on the umbo. Stipe tapering upward, slender, fistulous, rufescent beneath the white-fibrillose cuticle; the annulus thin, membranaceous, yellowish, persistent. Lamellae narrow, subdistant, free, white or yellowish; spores elliptic-oblong, obliquely apiculate 5-6 x 3-4 mic. uniguttulate.

Growing on the ground under Robinia and Gleditsia trees. Preston, O. Pileus 2-4 cm. in diameter, the stipe 3-5 cm. long and 2-4 mm. thick. Apparently related to such species as *Lepiota sulphurella* K. & C. and *L. citrinella* Speg.

72. *LEPIOTA RHODOPEPLA* MORGAN SP. NOV.

Pileus submembranaceous, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, rimulose-sulcate nearly to the center, beneath the cuticle whitish changing to rose-color; cuticle very thin, pale-yellow, soon separating into furfuraceous scales. Stipe tapering upward, fistulous, rose-colored beneath the white-fibrillose cuticle; the annulus thin, membranaceous, pale yellow. Lamellae rather broad, subdistant, whitish changing to pinkish, spores elliptic-oblong, 6-8 x 4-5 mic.

Growing on the ground among weeds in cultivated fields. Preston, O. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and 1-2 mm. thick.

IX. PROCERAE. *Pileus thick and fleshy, usually umbonate; the dermis floccose or fibrillose beneath the cuticle; the cuticle at first smooth and continuous, at length commonly separating into large irregular scales which are more or less deciduous. Stipe tapering upward from a thickened or bulbous base; the annulus often thick subcoriaceous, and truly movable.*

Lepiotae of the largest size, comprising numerous species; in many of these is to be found the typical "annulus mobilis."

a. *Lepiotae of the largest size; the annulus thick and easily movable.*

73. *LEPIOTA PORRIGENS*, *AGARICUS PORRIGENS* VIVIANI, FUNG. IT. 1834; *AGARICUS PROMINENS* FRIES, HYM. EUR. 1874.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thick, soft, white, deeply impressed around the apex of the stipe; the dermis white-fibrillose beneath the cuticle; the cuticle thin, drab or pale alutaceous, at length breaking up into irregular scales (except upon the umbo) which are more or less deciduous. Stipe very tall, tapering upward from a bulbous base, fistulous, fibrous-stuffed, minutely scaly or nearly glabrous, whitish or pale drab; the annulus mobile, raised to the summit of the stipe. Lamellae broad, close, white becoming pinkish, tapering inward, remote from the apex of the stipe; spores elliptic-oblong, obliquely apiculate, 12-16 x 9-10 mic.

Solitary; growing in rich soil along the borders of woodlands. Vermont, *Morgan*; New York, *Peck*; Wisconsin, *Brown*; Preston, O. Pileus 10-18 cm. in diameter; the stipe 20-30 cm. in height, the bulbous base 3-4 cm. thick, narrowing upward from about 2 cm. below to 9-12 mm. at the apex. The snow-white fully expanded pileus of this plant is strikingly different in appearance from that of the common *Lepiota procera*.

74. *LEPIOTA PROCERA*, *AGARICUS PROCERUS* SCOPOLI, *FLORA CARN.* 1772; *AMANITA PETIOLO PROCERO, ANNULATO*, IN *ACETABULUM PILEI IMMISSO, ETC.*, HALLER, *HIST. STIRP. HELVETIAE*, 1768.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thick, soft, white, deeply impressed around the apex of the stipe; the dermis beneath the cuticle radiately fibrillose and rufescent; the cuticle thick, at first smooth and continuous, rufous to umber in color, at length torn asunder, except upon the umbo, into large irregular scales which become scattered and gradually fall away. Stipe tall, tapering upward from a bulbous base, fistulous, fibrous-stuffed; the cuticle thin, flocculose, rufous or brownish, at length drawn apart into minute scales; the annulus thick, soft, subcoriaceous, mobile, raised high upon the stipe. Lamellae broad, close, white or pinkish, tapering slightly inward, free and remote from the apex of the stipe; spores elliptic or obovoid, apiculate, 14-18 x 9-11 mic. with one or more oily guttulae.

Solitary or gregarious, growing in meadows, pastures and open woods. Recorded from all parts of N. America. Pileus 8-16 cm. in diameter; the stipe 15-25 cm. in height, the bulbous base 2-3 cm. in thickness, tapering upward from 12-16 mm. below to 8-12 mm. at the apex. A splendid Agaric, known from the earliest times and found in all the countries of the earth.

75. *LEPIOTA RHACODIOIDES* P. HENNINGS, IN *ENGL. BOT. JAHRB.* 1901; *SYLLOGE XVII*, 3.

Pileus fleshy, campanulate-explanate, obtusely umbonate, covered as far as the middle with scattered, broad, brown, membranaceous scales, around the margin even, glabrous, whitish. Stipe very tall arising from a bulbous base, cylindric, even, glabrous, whitish or brownish; the annulus thick, mobile. Lamellae free, close, lanceolate, whitish; spores elliptic, 12-17 x 8-10 mic. uniguttulate.

Growing among old leaves. Pileus 15-20 cm. in diameter; the stipe 20-30 cm. in height, the bulbous base 3-4 cm. in thickness, tapering upward to 2-3 cm. The pileus lacks the umbo of *L. procera* and appears to be covered all over with the brown shaggy scales, which at length are deciduous around the margin and quite to the middle. This or a similar plant is reported from western New York by Prof. Peck in the 48 N. Y. Report; it is probably to be met with elsewhere. It differs from *Lepiota rhacodes* in having the spores of *L. procera*.

76. *LEPIOTA RHACODES* VITTADINI, FUNG. MANG. 1835; STEVENSON, BRIT. FUNGI; COOKE, ILLUSTR. PL. 22.

Pileus fleshy, at first globose then convex and explanate or slightly depressed; the flesh very thick, soft, white changing immediately to saffron-red when cut or broken; the dermis fibrillose-tomentose beneath the cuticle; cuticle thick, smooth, bay-brown, at first continuous, soon cracking and becoming reticulate, then separating into large irregular scales, which are drawn apart and persist upon the surface. Stipe tapering upward from a bulbous base, thick, stout, fistulous, fibrous-stuffed, smooth and glabrous, whitish; the annulus thick, mobile, fibrous-lacerate. Lamellae broad, close, whitish or pinkish, tapering inward and remote from the apex of the stipe; spores elliptic-ovoid, 10-12 x 6-8 mic.

Solitary or subcaespitose; growing in rich soil in fields and woods. Reported from various parts of the country from New England to the Pacific coast; but it is certainly rare. Pileus 10-15 cm. in diameter; the stipe 12-20 cm. long and 1-2 cm. thick above the very thick bulbous base.

77. *LEPIOTA MORGANI*, *AGARICUS MORGANI* PECK, BOTANICAL GAZETTE, 1879.

Pileus fleshy, at first globose then convex and expanded; the flesh thick, firm, white, deeply impressed around the apex of the stipe; the dermis white beneath the cuticle, radiately fibrillose; the cuticle at first continuous, buff to pale umber, soon broken up, except in the center, into irregular scales and patches, which are gradually drawn apart and at length are more or less deciduous. Stipe hard and firm, tapering upward from a thickened base, with a narrow tubule, fibrous-stuffed, the surface glabrous, buff to pale umber; annulus thick, soft, subcoriaceous, mobile, raised high upon the stipe. Lamellae rather broad, ventricose, close, remote from the stipe, at first white then changing to a greenish hue, at length dull green; spores in mass at first bright green, fading to dull green; with age becoming sordid, subelliptic, obliquely apiculate, 9-11 x 6-8 mic., with a large guttule.

Gregarious; growing in meadows, pastures and open woods: sometimes seen grouped in large rings. Met with throughout the Mississippi Valley from Michigan to the Gulf States and from Pennsylvania westward to Kansas and Nebraska. Pileus 10-20 cm. in diameter, the stipe 15-20 cm. in height, 1-2 cm. thick at the apex and 2-4 cm. thick at the base.

b. Lepiotae of small size; the annulus thin membranaceous, and not easily movable.

78. *LEPIOTA AMERICANA* PECK, 49 N. Y. REP. 1895; *AGARICUS AMERICANUS* PECK, 23 N. Y. REP, 1870.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thin, white, reddening when cut or broken; the dermis radiately fibrillose beneath the cuticle and at first white; the cuticle brick-color or bay-brown, at first continuous, soon breaking up except upon the umbo into small scales, which are gradually drawn apart and scattered over the surface. Stipe tapering upward from a base more or less thickened and elongated, fistulous, smooth and glabrous, white, reddening when handled; the annulus thin, membranaceous. Lamellae rather narrow, close, free, white; the spores subelliptic, 8-10 x 5-7 mic. uniguttulate.

Solitary or subcaespitose; growing in rich soil in grassy grounds or around old stumps, Eastern U. S. west to Michigan and Ohio, south to Alabama. Pileus 5-10 cm. in diameter; the stipe 8-12 cm. in length, 4-6 mm. thick at the apex, 8-12 mm. thick at the swollen base. When young and growing the whole plant except the epidermis of the pileus is white, but when handled or in drying it assumes a dull reddish or smoky-red color. It is quite probable that *Agaricus Badhami* B. & Br. catalogued by Sprague, Proc. Soc. N. H., Boston, 1859, was based upon specimens of this plant.

79. *LEPIOTA CALOCEPS* ATKINSON, JOURNAL MYCOLOGY, 1902.

Pileus fleshy, ovoid then convex and expanded; the flesh thick, firm, white; the dermis with a brownish or tawny-olivaceous cuticle, at first continuous, at length cracking and separating into rectangular or nearly square areas. Stipe arising from a bulbous base, fistulous, white above, dull flesh-color below, covered up to the annulus by angular patches of the dermis similar to those on the pileus. Lamellae rather narrow, close, free, dingy white; spores elliptic-oblong, obliquely apiculate, 6-8 x 2.5-3.0 mic.

Gregarious; growing on the ground in woods. New York, *Atkinson*. Pileus 4-8 cm. in diameter, the stipe 6-10 cm. in height and 6-10 mm. thick. It is possible this species belongs more properly in the *Clypeolariae*.

80. *LEPIOTA EXCORIATA*, *AGARICUS EXCORIATUS* SCHAEFFER, INDEX, 1774; ICONES TAB. 18 ET 19; COOKE, ILLUSTR. PL. 23; BRESADOLA, FUNG. MANG. TAV. 14.

Pileus fleshy, ovoid then convex and expanded, subumbonate; the flesh thick, soft, white, impressd around the apex of the stipe; the dermis white-fibrillose beneath the cuticle; the cuticle thin, firm, whitish or sometimes dusky in the center, splitting

and peeling up around the margin or breaking away in scales, sometimes altogether persistent. Stipe arising from a slightly thickened or bulbous base, fistulous, fibrous-stuffed, white, smooth and glabrous; the annulus firm, membranaceous. Lamellae broad, close, white, tapering inward and remote from the stipe; spores elliptic-oblong, 14-16 x 9-11 mic.

Growing in pastures and fields. New England, *Frost*; N. Carolina, *Curtis*; Alabama, *Atkinson*; Pacific Coast Cat. Pileus 5-7 cm. in diameter, the stipe 6-8 cm. long and 6-10 mm. thick. Withering and Persoon considered this species to be a small form of *Lepiota procera*; the size of the spores lends countenance to this opinion.

81. *LEPIOTA NAUCINOIDES*, *AGARICUS NAUCINOIDES* PECK, 29 N. Y. REP. 1876; *AGARICUS NAUCINUS* PECK, 23 N. Y. REF. 1870; MORGAN, MYC. FLORA M. V.

Pileus fleshy, subovoid and obtuse, then convex, expanded and explanate, subumbonate; the flesh thick, white; the dermis a thin membrane, white or smoky white, its surface commonly smooth and glabrous, but sometimes the cuticle breaks up into very minute fibrillose scales. Stipe tapering upward from a clavate base, fistulous, fibrous-stuffed, white, smooth and glabrous or becoming slightly fibrillose toward the base; the annulus thin, membranaceous, white, persistent. Lamellae broad, close, free, white, after maturity slowly changing in color to a dull livid; spores elliptic-ovoid, 8-9 x 5-6 mic. uniguttulate.

Gregarious; growing in grassy grounds, pastures, roadsides, etc. Eastern U. S. westward to Kansas. Pileus 4-8 cm. in diameter; the stipe 8-12 cm. in height, 6-12 mm. thick at the apex, 1-2 cm. thick at the base. European writers evidently confuse two species. *Agaricus naucinus* of Fries, and Berkeley, is *A. sphaerosporus* Krombliz. *Lepiota naucina* Bresadola, Fung. Mang. is *A. naucinoides* Peck. *Agaricus naucinus* with spherical spores occurs also in Australia; See Cooke's Handbook of Australian Fungi.

82. *LEPIOTA SOLIDIPIPES* PECK, 52 N. Y. REP. 1898.

Pileus fleshy, subhemispheric then convex and nearly plane; the flesh thick white; the dermis a continuous membrane, the surface smooth and glabrous, white sometimes with a slight pinkish tint. Stipe nearly equal or somewhat bulbous, solid, whitish, silky-fibrillose; the annulus thin, subevanescent. Lamellae close, free, white; spores subglobose, 4-5 mic. in diameter.

Growing in damp or swampy ground. New York, *Peck*. Pileus 5-10 cm. in diameter, the stipe 5-10 cm. long and 8-12 mm. thick. This species is distinguished from *Lepiota naucina* by its solid stipe and perhaps also by its smaller spores.

83. *LEPIOTA AVELLANEA* CLEMENTS, BOT. NEB. II, 1893.

Pileus fleshy, dry, explanate; the cuticle brown, at length lacerate toward the margin into appressed scales. Stipe arising from a bulbous base, fistulous, brown-fibrillose; the annulus thin, brownish, persistent. Lamellae cream-color, reddening with age, remote from the stipe; spores irregularly ovoid, acute at one apex, 8-10 x 5-6 mic.

Growing on the ground in a green house. Nebraska, *Clements*. Pileus 5 cm. in diameter, the stipe 4 cm. long and 8 mm. thick.

§3. *ANNULI SUPERI. THE VEIL IN THIS SECTION IS A PROLONGATION BEYOND THE APEX OF THE DERMIS OF THE STIPE; THIS IS REFLEXED OUTWARD AND DOWNWARD OVER THE LAMELLAE, THE LOWER SURFACE OF THE VEIL CORRESPONDING TO THE OUTER SURFACE OF THE STIPE. IT IS AT FIRST IN CONNECTION WITH THE EDGES OF THE LAMELLAE, FORMING A CONTINUOUS MEMBRANE OVER THE WHOLE HYMENIUM; AS THE PILEUS EXPANDS THIS CONNECTION IS DISSOLVED, BEGINNING WITH THE MARGIN OF THE PILEUS, UNTIL AT LENGTH THE ENTIRE MEMBRANE IS ATTACHED ONLY TO THE UPPER END OF THE STIPE, HANGING DOWN FROM IT AND FLARING OUTWARDS.*

X. *LYCOPERDINEAE. Pileus thick and fleshy; the dermis from the first composed of thick scales and pyramidal warts. Stipe thick, stout and usually solid, often prolonged downward and deeply rooting; the veil persistent entire or more or less torn and fragmentary.*

A tribe of several species named for *Lepiota lycoperdinae* Spegazzini, Fungi. Arg. The European representative is *Lepiota Vittadini* Moretti, Bot. Ital., "A large species, of a pure white; extremely beautiful" (Berkeley.)

84. *LEPIOTA POLYPYRAMIS*, A. (AMANITA) POLYPYRAMIS B. & C., ANN. & MAG. N. H. 1853.

Pileus fleshy, subglobose then convex and expanded; the flesh thick, soft, white; the dermis composed of thick pyramidal warts, which, by the growth of the pileus, are gradually separated, except in the center, drawn apart and to some extent deciduous. Stipe thick at the base and tapering downward into a very long rooting portion, tapering slightly upward, solid, the surface white and somewhat scaly; the veil a large, thick, warted membrane.

torn in pieces by the expansion of the pileus and at length falling away. Lamellae close, white, tapering inward and reaching the stipe; spores elliptic, $8-10 \times 6-8$ mic.

Growing in rich soil among old leaves in woods. S. Carolina, *Curtis*; Preston, O. Pileus 10-15 cm. in diameter; the stipe 15-25 cm. in length including the root, 3-5 cm. thick at the base. This species is one of the forms of *Amanita solitaria*, so thoroughly discussed and so elegantly illustrated by Atkinson in "Mushrooms edible, poisonous, etc."

85. *LEPIOTA RADICATA*, *AMANITA RADICATA* PECK,
BULL. TORR. CLUB, 1900.

Pileus fleshy, subglobose, convex then expanded; the flesh thin, white; the dermis composed of large thick persistent scales and warts, all white or becoming dusky; the veil lacerate, the fragments to some extent appendiculate, at length more or less deciduous. Stipe tapering upward from a thick base and downward into a long root, solid, white, fibrillose above, floccose-scaly below. Lamellae broad, close, white, adnexed; spores oblong, $9-11 \times 5-6$ mic.

Solitary; growing in grassy ground in thin woods. New Jersey, *Sterling*; Preston, O. Pileus 5-10 cm. in diameter; the stipe 6-8 cm. long above the rooting portion which is 4-6 cm. in the ground; the base of the stipe 12-20 mm. thick, the apex 6-8 mm. thick. This too is only another form of the *Amanita solitaria* of Atkinson's "Mushrooms."

86. *LEPIOTA DAUCIPES*, A. (*AMANITA*) *DAUCIPES* B.
& M.; SYLL. CRYPT. 1856.

Pileus fleshy, globose then convex and expanded; the flesh thick, compact, white; the dermis composed of crowded, pyramidal warts, polygonal at the base and saffron-yellow at the apex; the veil fibrillose-floccose, yellowish, stretched between the margin of the pileus and the apex of the stipe, at length torn in pieces and disappearing. Stipe solid, with a thick base, narrowed upward to the apex and tapering downward into a long root, clothed below with broad, imbricate scales. Lamellae rather narrow, tapering to both ends, white, reaching the stipe; spores globose (?).

Growing in cultivated fields. Columbus, O., *Sullivan*. Pileus 6 cm. in diameter; the stipe 12-15 cm. long including the rooting portion, about 5 mm. thick at the narrow apex, but 3-4 cm. at the thickened base. The polygonal warts of the pileus are like those of *Lepiota Vittadini*, but are colored at the apex.

87. *LEPIOTA PELIDNA*, A. (*LEPIOTA*) *PELIDNUS* B. & M.; SYLL. CRYPT. 1856.

Pileus fleshy, ovoid then convex and expanded; the flesh thick, white, rufescent; the dermis thick, furfuraceous-rugose, greenish-livid in color; the veil continuous with the dermis and of similar substance, at maturity lacerate, the fragments dependent from the margin of the pileus. Stipe arising from a thick bulbous base, solid, elongated, furfuraceous-scaly and colored as the pileus. Lamellae narrow, white or pinkish, rufous when dried, remote from the dilated apex of the stipe and there attached by a very short tooth; spores globose and oblong, 10 mic. in length.

Growing on fallen trunks, Columbus, O., *Sullivant*. Pileus 7-9 cm. in diameter; the stipe 11-15 cm. long, in the middle 1.5-2 cm. thick, the bulbous base 3-4 cm. in diameter. The species is remarkably distinguished by the greenish-livid color of the pileus and stipe, the color of *Russula virescens*.

88. *LEPIOTA DRYMONIA* MORGAN SP. NOV. ILLUSTRATION IN HERBARIUM.

Pileus fleshy, subglobose then convex and expanded; the flesh thick, white; the dermis thick, drab to pale amber, soon breaking up into reflexed, squarrose scales, which are gradually drawn apart and scattered over the white surface. Stipe stout, solid, tapering upward from a thick base, squarrose with reflexed scales, colored as on the pileus; the veil thin, white membranaceous, lacerate, the outer fragments appendiculate. Lamellae broad, close, white, free; spores —.

Growing on the ground among old leaves in woods. Pomfret, Vt., *Morgan*. Pileus 8-10 cm. in diameter; the stipe 10-14 cm. long, 12-16 mm. thick at the apex, 3-4 cm. thick at the base. This is certainly an elegant species of the type of *Lepiota Vittadini*, but unfortunately I failed to bring away my specimens and get the spore measurements.

XI. *LENTICULARES*. *Dermis of the pileus growing uniformly with the expansion of the latter and maintaining a smooth, unbroken surface, but coated with a thin, viscid epidermal layer. Stipe solid or stuffed; the veil large membranaceous.*

A tribe consisting of a few species of large Agarics, most of them formerly referred to *Amanita*. Karsten and Gillet transfer the species of Frie's fourth tribe to *Lepiota*. Costantin and Dufour describe *Lepiota Persoonii* Fr., *L. lenticularis* Lasch and *L. arida* Fr. all with "chapeau visqueux."

89. *LEPIOTA GUTTATA*, *AGARICUS GUTTATUS* PERSEON, SYNOPSIS, 1801; *AGARICUS LENTICULARIS* LASCH IN LINNAEA, 1828.

Pileus fleshy, at first globose then convex and expanded; the flesh thick, soft, white; the dermis a thin, firm, smooth membrane, pale alutaceous to pinkish, with a viscid cuticle. Stipe elongated, at the base slightly bulbous, or wholly equal, spongy-stuffed, minutely scaly or subglabrous, white; annulus a large smooth membrane, rather distant from the pileus. Lamellae rather narrow, crowded, whitish, tapering inward but free; spores —.

Growing in humid places in woods. N. Carolina, *Curtis*. Pileus 7-10 cm. in diameter, the stipe 10-15 cm. long and about 2 cm. thick.

90. *LEPIOTA BENTISTA* MORGAN SP. NOV.

Pileus fleshy, globose then convex and explanate; the flesh thin, white; the dermis a thin, smooth membrane whitish or pale alutaceous; with a viscid cuticle. Stipe arising from a slightly bulbous base, subequal, stuffed, white, smooth but viscid; the annulus thin, white, membranaceous. Lamellae narrow, close, white, free; spores elliptic-ovoid, $9-11 \times 5-6$ mic.

Growing on the ground. Blue Mounds, Wis., *Denniston*. Pileus 5-8 cm. in diameter, the stipe 6-8 cm. long and 8-12 mm. thick.

THE DESCRIPTIVE SYNOPSES.

LEPIOTA Persoon, *Synopsis* 1801; *Fries*, *Syst. Myc.* 1821. *Hym. Eur.* 1874; *Saccardo*, *Sylloge Fungorum*, V, IX, XI, XIV, XVI, XVII.

Pileus soft fleshy, rather dry; *veil* marginal. *Stipe* hollow or fibrous-stuffed, rarely solid, commonly tapering upward from a thickened base; *volva* none. *Lamellae* free, approximate or remote, rarely reaching the stipe; *spores* white, sometimes with a tinge of pink or yellow, in one species bright green.

§ 1. *ANNULI INFERI*. THE VEIL IN THIS SECTION HAS A TWO-FOLD ORIGIN; IT IS A CONTINUATION OF THE OUTERMOST ROW OF CELLS OF THE STIPE WHICH HAS GROWN FOR SOME TIME WITH THE STIPE BY INTERCALARY GROWTH AND PASSES INTO THE MARGIN OF THE PILEUS; AND CONVERSELY IT IS A CONTINUATION OF THE OUTERMOST HYPHAE OF THE PILEUS PASSING INTO THE SURFACE OF THE STIPE. THE SEPARATION TAKES PLACE AT THE MARGIN OF THE PILEUS, THE VEIL

REMAINS ATTACHED TO THE STIPE AS A RING OR AS A SHEATH RUNNING DOWN ITS SURFACE OR SOMETIMES PORTIONS OF IT FORM A FRINGE OR APPENDAGE TO THE MARGIN OF THE PILEUS.

I. MESOMORPHAE. *Dermis of the pileus entire, the surface of both pileus and stipe smooth and glabrous; the veil annulate, often evanescent.* Species: 1-2

II. EUCONIATI. *Dermis of the pileus not lacerate, but the surface pruinose, finely pulverulent or minutely furfuraceous; the investment of the stipe usually similar to that of the pileus; the veil often appendiculate.*

A. STIPE GLABROUS. Species: 3

B. STIPE PULVERULENT OR MINUTELY FURFURACEOUS. Species: 4-12

III. GRANULOSAE. *Dermis of the pileus or at least its outer layer composed of granules, minute warts or furfuraceous particles; the investment of the stipe similar to that of the pileus; the veil of like structure, lacerate and appendiculate.*

a. Lamellae adnate to the stipe. Species: 13-16

b. Lamellae free from the stipe or merely reaching it.
. Species: 17-20

IV. CLYPEOLARIAE. *Dermis of the pileus a thin membrane, radiately fibrillose, the cuticle at first continuous but sooner or later broken up and drawn apart by the growth of the pileus, this at length presenting a white-fibrillose surface sprinkled with colored scales; the veil lacerate, part of it appendiculate, continuous downward with the floccose-fibrillose investment of the stipe.* Species: 21-28

V. ASPERAE. *Dermis of the pileus or at least its superficial layer fibrillose-scaly from the first, the scales reflexed and squarrose or the fibres fasciculate and convergent into pointed warts; the veil and the cuticle of the stipe may be of similar texture or the stipe may be nearly glabrous.* Species: 29-35

VI. GLIODORMATAE. *Dermis of the pileus continuous, never separating into scales, but the surface invested by a more or less thickened layer of gluten, pellucid or colored. Stipe commonly dry and squamulose or subglabrous, in a few species with a viscid cuticle like the pileus.* Species: 36-41

§ 2. ANNULI MOBILES. THE VEIL IN THIS SECTION IS MARGINAL AND INFERIOR AS IN THE FIRST SECTION, BUT THE DERMIS OF THE PILEUS AND THAT OF THE STIPE ARE DISSIMILAR, THE COL-

ORED CUTICLE OF THE PILEUS NOT BEING CONTINUED DOWNWARD UPON THE STIPE, RARELY COLORING EVEN THE UPPER MARGIN OF THE VEIL. THE VEIL IS ANNULATE UPON THE STIPE AND IS COMMONLY A THIN MEMBRANACEOUS BAND, THOUGH SOMETIMES IT IS THICKENED AND SUBCORIACEOUS; IT IS CONTINUOUS DOWNWARD WITH THE DERMIS OF THE STIPE, AND BY ITS UPPER BORDER CONNECTS WITH THE DERMIS OF THE PILEUS. SOMETIMES THE VEIL IS FIRST TORN AWAY FROM THE STIPE AND DRAWN UPWARD TO SOME EXTENT UNTIL THE EXPANSION OF THE PILEUS BEGINS, THUS GIVING RISE TO THE TYPICAL "ANNULUS MOBILIS."

VII. SUBCLYPEOLARIAE. *Dermis of the pileus a thin membrane, radiately fibrillose; the cuticle at first continuous, at length separating into small or minute scales, which are drawn apart and scattered over the white fibrillose surface. The cuticle of the stipe commonly white, smooth and even or only appressedly fibrillose; the annulus thin and membranaceous, usually persistent.*

- a. Scales of the pileus white, cineleous, yellowish. Species: 42-45
- b. Scales of the pileus red, rufous, fulvous. Species: 46-52
- c. Scales of the pileus brown or blackish. Species: 53-59

VIII. HIATULOIDES. *Pileus submembranaceous, thin, soft and flexible, umbonate; the flesh well nigh obsolete except beneath the central disc; the dermis radiately fibrillose and plicate-sulcate often to the umbo; the cuticle separating into scales. Stipe slender and sometimes much elongated, fistulous and fragile, subglabrous; the annulus thin and membranaceous.*

- a. Pileus white with pallid or brownish scales. Species: 60-66
- b. Pileus white with yellow or all yellow. Species: 67-72

IX. PROCERAE. *Pileus thick and fleshy, usually umbonate; the dermis floccose or fibrillose beneath the cuticle; the cuticle at first smooth and continuous, at length commonly separating into large irregular scales which are more or less deciduous. Stipe tapering upward from a thickened or bulbous base; the annulus often thick subcoriaceous, and truly movable.*

- a. Lepiotae of the largest size; the annulus thick and easily movable. Species: 73-77
- b. Lepiotae of small size; the annulus thin membranaceous, and not easily movable. Species: 78-83

§ 3. ANNULI SUPERI. THE VEIL IN THIS SECTION IS A PROLONGATION BEYOND THE APEX OF THE DERMIS OF THE STIPE; THIS IS REFLEXED OUTWARD AND DOWNWARD OVER THE LAMELLAE, THE LOWER SURFACE OF THE VEIL CORRESPONDING TO THE OUTER SURFACE OF THE STIPE. IT IS AT FIRST IN CONNECTION WITH THE EDGES OF THE LAMELLAE, FORMING A CONTINUOUS MEMBRANE OVER THE WHOLE HYMENIUM; AS THE PILEUS EXPANDS THIS CONNECTION IS DISSOLVED, BEGINNING WITH THE MARGIN OF THE PILEUS, UNTIL AT LENGTH THE ENTIRE MEMBRANE IS ATTACHED ONLY TO THE UPPER END OF THE STIPE, HANGING DOWN FROM IT AND FLARING OUTWARD.

X. LYCOPERDINEAE. *Pileus thick and fleshy; the dermis from the first composed of thick scales and pyramidal warts. Stipe thick, stout and usually solid, often prolonged downward and deeply rooting; the veil persistent entire or more or less torn and fragmentary.* Species: 84-88

XI. LENTICULARES. *Dermis of the pileus growing uniformly with the expansion of the latter and maintaining a smooth, unbroken surface, but coated with a thin, viscid epidermal layer. Stipe solid or stuffed; the veil large membranaceous.* Species: 89-90

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THE RUSTS OF GUATEMALA.*

FRANK D. KERN.

Two botanical excursions have been made to Guatemala, Central America, by Professor W. A. Kellerman; one during the months of January, February and March, 1905, and another during the corresponding season of 1906. The principal object of the trips was to secure collections of parasitic fungi, but a large amount of material which will serve to illustrate the general botanical character of the country was brought back. The trips covered the territory from the Atlantic to the Pacific coast, special attention being given to collecting in the higher altitudes of the intervening mountainous and volcanic regions.

Professor Kellerman has very generously sent much of his material to a number of workers for identification and study, the collections of rusts with some notes having been placed in the hands of the writer. The present communication is a report of the studies upon the larger portion of the material. There still remain a number of specimens, some of which may be undescribed, but concerning which no definite conclusions have yet been reached. In all determinations and in the drawing up of descriptions of new species the writer has been aided by Prof. J. C. Arthur and enjoyed the privilege of access to his herbarium and library.

In many instances new hosts have been added and the geographical distribution has often been extended. It has been found necessary to describe several species as new. Perhaps the most notable single collection is the *Aecidium* on *Byrsonima crassifolia*. The species are distributed among all the larger groups of the Uredinales.

I. COLEOSPORIUM IPOMOEAE (Schw.) Burr. — On *Ipomoea macrocalyx* (Ruiz. & Pav.) Choisy (host no. 5187), Laguna, Depart. Amatitlan, alt. 1200 m., Jan 20, 1906, no. 5408

*Contributions to Guatemalan Mycology IV. (The three previous articles in this series were by W. A. Kellerman.)

(host no. 5191) Jan. 19, 1906, no 5450: *Ipomoea tyrianthina* Lindl. (host no. 5192), Moran, Depart. Amatitlin, alt. 1205 m., Jan 25, 1906, no. 5435; *Pharbitis hederacea* (L.) Roth (host nos. 5185, 5186), Laguna, Depart. Amatitlán, alt. 1200 m., Jan. 17, 1906, nos 5409, 5405.

All of the above hosts were determined by H. D. House.

2. COLEOSPORIUM VERBESINAE Diet. & Holw. — On *Verbesina turbacensis* H. B. K. (host 5190), Los Amates, Depart. Izabal, March 15, 1905, no. 5315; *Verbesina gigantea* Jacq. (host no. 5183), Patalúl, Depart. Sololá, Feb. 13, 1906, no. 5385.

The hosts were examined by J. M. Greenman, who has attached the specific names with some doubt.

3. COLEOSPORIUM ELEPHANTOPODIS (Schw.) Thuem. — On *Elephantopus mollis* H. B. K., (det. by H. A. Gleason), Los Amates, Depart Izabal, alt. 90 m., Mar. 15, 1905, no. 5362.

4. COLEOSPORIUM EUPATORII Arth. — On *Eupatorium collinum* DC., (host no. 5181), Palmar, Depart. Quezaltenango, Feb. 11, 1906, no. 5458.

This host was determined by J. M. Greenman, and is a new one for the species which heretofore has been known only on *Eupatorium macrophyllum* L.

5. COLEOSPORIUM PLUMIERAE Pat. — On *Plumiera rubra* L., (host no. 5218), Palmar, Depart. Quezaltenango, Feb. 11, 1906, no. 5460.

This is the first time this species has been collected on the continent, the other collections coming from the West India Islands. The host has been identified by John Donnell Smith.

6. MELAMPSORA BIGELOWII Thuem. — On *Salix Humboldtiana* Wild. (host det. by R. F. Griggs), near Patalúl, Depart. Sololá, Feb. 16, 1906, no. 5473

7. UROPYXIS MIRABILISSIMA (Peck) Magn. — On *Odossemon* sp., Volcano Agua, Depart. Sacatepéquez, alt. 3000 m., Feb. 15, 1905, no. 4624.

8. RAVENELIA SPINULOSA Diet. & Holw. — On *Cassia biflora* L (host no. 5189), Gualan, Depart. Zacapa, alt. 122 m., Dec. 30, 1905, no. 5441.

This host has been identified by J M. Greenman and is a new one for this species of rust. Sydow (Annal. Myc. 1:330, 1903) and Dietel (Bot. Centr. Beih. 20:394, 1906) have reported

another species of *Ravenelia*, *R. papillifera* Syd. on *Cassia biflora* from Bahama Islands, collected by J. J. and A. R. Northrop, but this material has since been examined by N. L. Britton, of the New York Botanical Garden, who reports that it is *Cassia angustisiliqua* Lam. and not *C. biflora* L.

9. RAVENELELIA HUMPHREYANA P. Henn. — On *Poinciana pulcherrima* L. (*Caesalpinia pulcherrima* Lév.), (host det. by R. F. Griggs), Gualan, Depart. Zacapa, alt. 122 m., Dec. 27, 1906, no. 5427.

A common species in the North American tropics wherever this host occurs. The type of *R. Humphreyana* was said to be on *Cassia* sp., but a careful examination shows that it is undoubtedly *Poinciana pulcherrima*. As pointed out by W. H. Long (Jour. Myc. 12:236 1906), *Ravenelia pulcherrima* Arth. is a synonym of *R. Humphreyana*.

10. KUEHNEOLA ALBIDA (Kuehn) Magn. — On *Rubus polioophyllus* Focke (host no. 4775), Autigua, Depart. Sacatepéquez, Feb. 18, 1905, no. 5363; *Rubus* sp., Guatemala, Depart. Guatemala, Feb. 12, 1905, no. 4625.

No. 5363 shows some variation in the surface of the urediniospores, the markings being much coarser than is typical. The host of this number was determined by John Donnell Smith.

11. PUCCINIOSIRA BRICKELLIAE Diet. & Holw. — On *Brickellia cavanillesii* Gray (host no. 5198), Volcano Cerro Quemado, Depart. Quezaltenango, Feb. 8, 1906, no. 5448.

This species has previously been known only from Mexico. J. M. Greenman, who examined the host, is somewhat doubtful about the specific determination.

12. PUCCINIOSIRA PALLIDULA (Speg.) Lagerh. — On *Triumfetta* sp. (host no. 4584). Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 3, 1905, no. 4608.

13. CRONARTIUM QUERCUUM Miy. — On *Quercus tomentosa* Willd. (host no. 5234), Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 2, 1905, no. 5304.

This host was submitted to John Donnell Smith, who applied the above specific name with an indication that it is not a typical specimen.

14. UROMYCES CELOSIAE Diet. & Holw. — On *Iresine canescens* H. B. K., Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 2, 1905, no. 4344; Laguna, Depart. Amatitlán, alt. 1200 m., Jan. 20, 1906, no. 5395.

Although all previous collections of this species have been on *Celosia*, these specimens on *Iresine* agree so well with the type specimen, and the similarity between the hosts is so great, that they are placed here without hesitation. The hosts have been determined by J. N. Rose and W. A. Kellerman.

15. UROMYCES HELLERIANA Arth. — On *Cayaponia racemosa scaberrima* Cogn. (host no. 5207, det. by John Donnell Smith), Moran, Depart. Amatitlán, alt. 1205 m., Feb. 1906, no. 5436.

16. UROMYCES INDIGOFERAE Diet. & Holw. — On *Indigofera mucronata* Spreng. (host no. 5228, det. by J. M. Greenman), Gualan, Depart. Zacapa, Dec. 28, 1905, no. 5444.

17. PUCCINIA CYNANCHI Lagerh. — On *Philibertia crassifolia* Hemsl. (host no. 4359, det. by John Donnell Smith), Laguna, Depart. Amatitlán, alt. 1200 m., Feb. 11, 1905, no. 4348, Jan. 20, 1906, no. 5437.

This species is morphologically very similar to *Puccinia Gonolobi* Rav., but differs in its habits of growth, spreading evenly over the surface, extending to the young shoots and sometimes forming witches' brooms, while in *P. Gonolobi* the sori are in small groups.

18. PUCCINIA TITHONIAE Diet. & Holw. — On *Tithonia tubaeformis* Cass. (host no. 4374, det. by John Donnell Smith), Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 3, 1905, no. 4328; Laguna, Depart. Amatitlán, alt. 1200 m., Jan 30, 1906, no. 5425.

19. PUCCINIA SENECTIONICOLA Arth. — On *Senecio petasioides* Greenm. (host no. 5200), Volcano Atitlán, Depart. Sololá, Feb. 16, 1906, no. 5442, (host no. 5201), Volcano Cerro Quemado, Depart. Quezaltenango, Feb. 8, 1906, no. 5418, *Senecio Warszewiczii* A.Br. & Bouche (host no. 5206), Volcano Cerro Quemado, Depart. Quezaltenango, Feb. 8, 1906, no. 5445.

The hosts were determined by J. M. Greenman.

20. PUCCINIA ROSEA (Diet. & Holw.) Arth. — On *Ageratum conyzoides* L., (host no. 4386), Mazatenango, Depart. Suchitepéquez, alt. 330 m., Feb. 28, 1905, No. 4346, (without host no.) no. 5373; San Filipe, alt. 615 m., Depart. Retalhuleu, Feb. 4, 1906, no. 5446.

This species is very similar in the uredinial and telial stages to *Puccinia conoclinii* Seym. and has about the same host distribution. It may be distinguished by its larger spores, the thicker walls and more pronounced umbo of the teliospores.

21. PUCCINIA CONOCLINII Seymour. — On *Eupatorium pycnocephalum* Less. (on host no. 4369), det. by B. L. Robinson), Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 1, 1905, no. 5312; *Eupatorium Rafaelense* Coulter (host no. 5197, det. by J. M. Greenman), Volcano Cerro Quemado, Depart. Quezaltenango, Feb. 8, 1906, no. 5449.

22. PUCCINIA SORGHII Schw. — On *Zea Mays* L., Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 3, 1905, no. 5474.

23. PUCCINIA HETEROSPORA B. & C. — On *Sida cordifolia* L., (host det. by John Donnell Smith), Gualán, Depart. Zacapa, alt. 122 m., Jan. 23 and March 12, 1905, no. 4323.

24. PUCCINIA COGNITA Syd. — On *Verbesina fraseri* Hemsl. (host det. by B. L. Robinson), Guatemala, Depart. Guatemala, alt. 1465 m., Feb. 1, 1905, no. 4324; Laguna, Depart. Amatitlán, alt. 1200 m., Jan. 1906, no. 5412.

25. PUCCINIA ESLAVENSIS Diet. & Holw. — On *Panicum leucophaeum* H. B. K., Laguna, Depart. Amatitlán, alt. 1200 m., Jan. 31, 1906, no. 5469.

26. PUCCINIA TETRAMERII Seymour. — On *Blechnum Brownei* Juss. (host no. 5214, det. by John Donnell Smith), Laguna, Depart. Amatitlán, Jan. 17, 1906, no. 5400.

27. PUCCINIA PRUNI-SPINOSAE Pers. — On *Amygdalus persica* L., Antigua, Depart. Sacatepéquez, Feb. 15, 1905, no. 5358.

28. PUCCINIA ARECHAVALETAE Speg. — On *Cardiospermum grandifolium* Sw. (host no. 5211, det. by John Donnell Smith), El Rancho, Depart. Jalapa, Jan. 6, 1906, no. 5461.

29. PUCCINIA INFREQUENS Holw. — On *Salvia cinabarina* Mart. & Gal. (host no. 5229, det. by J. M. Greenman), Volcano Atitlán, Depart. Sololá, Feb. 15, 1906, No. 5438.

30. PUCCINIA XIMENESIAE Long. — On *Verbesina* sp. (host no. 5196, det. by J. M. Greenman), Laguna, Depart. Amatitlán, alt. 1200 m., Jan. 20, 1906, no. 5455.

31. PUCCINIA HYPTIDIS (Curt.) Tr. & Earle. — On *Hyptis spicata* Poit., Morán, Depart. Amatitlán, alt. 1205 m., no. 4327, (host no. 5236), no. 5310, (host no. 5235), no. 5311; (host no. 5227), Fiscal, Depart. Guatemala, Jan. 11, 1906, no. 5443.

The hosts of the first three collections were determined by John Donnell Smith, that of the last collection by J. M. Greenman. Only urediniospores could be found on any of the collections of *Hyptis*. Two collections, one on *Hyptis urticoides*, and one on *H. lilacina*, are not included here, as they differ in having urediniospores with more dense and finer markings and several scattered pores. These have not been assigned to any species.

32. **PUCCINIA HELIOTROPII** Kern & Kellerm. sp. nov.

III. Telia hypophyllous, gregarious, densely crowded in orbicular groups, 1.5-4 mm. across, often confluent, round, small, 0.1-0.2 mm. across, early naked, pulverulent, chestnut-brown, becoming cinereous by germination, ruptured epidermis inconspicuous; teliospores oblong, rounded or obtuse above, usually narrowed below, $14-10 \times 30-40 \mu$, somewhat constricted at septum, wall pale cinnamon-brown, thin, about 1μ , thicker at apex ($2-4 \mu$), smooth; pedicel colorless, about half length of spore.

On *Heliotropium indicum* L. (host no. 4372), Gualán, Depart. Zacapa, alt. 122 m., Mar. 12, 1905, no. 4326 (type) and Dec. 30, 1905, no. 5422.

Host no. 4372 was determined by John Donnell Smith and the same collection also bears aecia which without doubt belong to an entirely distinct species of rust. This species is of the ordinary leptopuccinia type. It differs from *Puccinia heliotropicola* Speg. by the longer and more oblong spores with a thickened apex.

33. **PERIDERMIMUM GRACILE** Arth. & Kern.—On *Pinus filifolia* Lindl., Antigua, Depart. Sacatepéquez, Feb. 13, 1905, nos. 4626, 5355, 5324.

One of the above collections (host) was submitted to C. S. Sargent for identification, the others have been determined by comparison. The type of the species was on the same host from Oaxaca, Mexico.

34. **AECIDIUM CISSI** Wint.—On *Cissus sicyoides* L. (host no. 5223, det. by J. M. Greenman), Gualán, Depart. Zacapa Dec. 28, 1905, no. 5440; Los Andes, Depart. Izabal, Jan. 17, 1905, no. 5335.

35. **AECIDIUM GUATEMALENSIS** Kern & Kellerm.
sp. nov.

O. Pycnia epiphyllous, gregarious, abundant on discolored spots opposite the aecia, inconspicuous, punctiform, subepidermal, becoming dark brown, globoid, $100-115 \mu$ wide, $80-105 \mu$ high; ostiolar filaments up to 65μ long.

I. Aecia hypophyllous, gregarious, numerous on indefinite discolored spots, 0.5-1.5 cm. across, especially extending along the veins, short, 0.2-0.3 mm. in diameter; peridium white, margin erect, slightly erose, peridial cells rhomboidal, 15-25 μ long, somewhat overlapping, walls of equal thickness 2-4 μ , inner moderately verrucose, outer smooth, transversely striate; aeciospores globose. 16-18 x 18-23 μ , wall colorless, thin, about 1 μ , finely and inconspicuously verrucose.

On *Heliotropium indicum* L (host no. 4372), Gualán, Depart. Zacapa, alt. 122 m., Mar. 12, 1905, no. 4326.

The specimens from which this species is described are a part of the same collection from which *Puccinia Heliotropii* sp. nov. is described in this paper. In gross appearance and habit of growth this species differs from *Aecidium Heliotropii* Tr. & Gal. and *Aecidium biforme* Peck. It may possibly be identical with *Aecidium heliotropidatum* Schw. of which no specimens have been examined. The description, however, indicates a distinct difference in the distribution on the leaf surface and in the manner of development in the groups.

36. AECIDIUM BYRSONIMAE Kern & Kellerm. sp. nov.

O. Pycnia amphigenous and caulicolous, preceding or among the aecia, numerous, evenly scattered over the hypertrophied leaves and branches, conspicuous, subcuticular, becoming chestnut-brown, conical, large, 150-200 μ broad, by 75-85 μ high; ostiolar filaments wanting.

I. Aecia amphigenous and caulicolous, from an unlimited mycelium causing extensive hypertrophy, numerous, scattered often crowded, cylindrical, long, deep-seated, 0.5-0.7 mm. in diam. by 1-1.5 mm. high; peridium white, margin erose, somewhat recurved, often deeply torn, peridial cells rhomboidal, overlapping 35-50 μ long, outer wall 3-4 μ thick, smooth, inner wall 5-7 μ thick, coarsely verrucose, transversely striate; aeciospores angularly oval or oblong, often truncate at base, and narrowed above, 26-35 x 39-57 μ , wall pale yellow, coarsely verrucose, thick (3-5 μ), much thicker above (5-15 μ).

On *Byrsonima crassifolia* (L.) H. B. K. (host no. 4368), Sierra de las Minas, Depart. Baja Verapaz, alt. 615 m., Mar 10, 1905, no. 4325.

An interesting species because of the hypertrophy it produces, the prominent subcuticular pycnia, and the long and numerous aecia, but especially on account of the very odd spores, which are

exceedingly large, with coarsely marked thick walls, much thickened above. The characters of the pycnia and eacia are so unlike those of autoecious species on *Malpighiaceae* that it is assumed to be heteroecious. The fact that the pycnia are sugcuticular indicates that it does not belong to the *Uromyces-Puccinia* group but to some genus of the *Raveneliatae* or *Uropyxidatae*. Both host and fungus of a specimen in the New York Botanical Garden, collected at Rancho Guerro, Jalisco, Mexico, June 15 1892, by M. E. Jones, said to be on an *Ericaceous* host, agree perfectly with this Guatemalan specimen. Because of the long bladdery peridia there is a resemblance to *Peridermium*, and the Mexican specimen has been so labelled, but there can now be no doubt that it belongs here.

37. UREDO BIOCELLATA Arth.—On *Pluchea odorata* Cass. (host no. 5202, det. by J. M. Greenman), Amatitlán, Depart. Amatitlán, Jan. 25, 1906, no. 5388.

The sides of the spores in this species are inflated in a very conspicuous manner making them unusually odd. It has been known before only from the type locality, Florida Keys, on *Pluchea purpurascens*.

38. UREDO FICINA Juel.—On *Ficus aurea* Nutt; Guatlán, Depart. Zacapa, Jan 1, 1906, no. 5456.

This species differs from the common *Ficus* rust, *Uredo Fici* Cast., in its larger spores and especially in the paraphyses, which are curved, strong and thick-walled as compared with the more erect, slender, thin-walled ones of *U. Fici*. The host of the Guatemalan specimen agrees so well with a specimen from Florida known to be *Ficus aurea*, that it has been called by that name. The fungus on the Florida specimen is also *U. ficina*. The species is chiefly known from South America, where the type was collected.

39. UREDO CABRERIANA Kern & Kellerm. sp. nov.

II. Uredinia chiefly hypophyllous, gregarious in orbicular groups 2-4 mm. across, or scattered singly, roundish, 0.5-1 mm. across, subepidermal, soon naked, chestnut-brown, pulverulent, ruptured epidermis conspicuous; paraphyses intermixed with the spores, spatulate or sometimes capitate, often irregular, 10-23 x 40-80 μ , heads solid, stipes hollow; urediniospores broadly obovate-ellipsoid, 17-27 x 27-34 μ , wall dark chestnut-brown, thick (3-4 μ), thicker above (5-7 μ) coarsely echinulate with blunt conical tubercles 3-4 μ apart, pores 3, rarely 4, equatorial.

On *Buettneria lateralis* Presl. (?) (host no. 5219), Livingston, Depart. Izabal, Jan. 18, 1905, no. 5465.

This host was determined from fragments by John Donnell Smith, who expresses some doubt as to the correctness of the specific name. With the exception of two species of *Aecidium* from South America, described by P. Hennings, this is the only rust reported on a host belonging to this family, *Sterculiaceae*, or any closely related family. No other spore structures being present the species is described as *Uredo*. The thickened apex of the spores, the intermixed paraphyses, and the gross appearance of the sori indicate that its relationship is with the *Raveneliatae*.

The name is to honor Sn. Manuel Estrada Cabrera, President of Guatemala, patron of education and applied science.

40. **UREDO TRIXITIS** Kern & Kellerm. sp. nov.

II. Uredinia hypophyllous, scattered, small, round, 0.3-0.5 mm. across, soon naked, becoming somewhat pulverulent, dark chestnut brown, ruptured epidermis conspicuous; without peridium or paraphyses; urediniospores broadly ellipsoid, sometimes somewhat narrowed below, $19-24 \times 25-30 \mu$, wall light chestnut-brown, medium thick ($2-3 \mu$), sparsely and rather inconspicuously echinulate, pores distinct, 2, opposite.

On *Trixis frutescens* P. Br. (host no. 5204), San Lucas, Depart. Sololá, Feb. 15, 1906, no. 5432.

This host was determined by J. M. Greenman and belongs to a section of the *Carduaceae* which does not include any other genera known to bear rusts.

THE LEPIOTAS OF SWEDEN.

H. C. BEARDSLEE.

The following notes on the species of *Lepiota* collected in Sweden by Mr. C. G. Lloyd and the writer during the summer of '05 may be of interest in connection with the papers upon this genus which are appearing in the JOURNAL.

The number of species collected was not large, probably partly at least because work was necessarily stopped the first week of September. Doubtless other species might have been found in the same collecting grounds if work had continued a few weeks longer. The species detected were six in number. *L. procera*, *naucina*, *rhacodes*, *cristata*, *metulaespora*, and *amiantina*. Of *Lepiota procer* little need be said. It was found in the same surroundings in which it would have appeared in the United States and agreed with our plant in every detail. There is, however, food for reflection in the fact that this fine species which lends itself so well to description and illustration that it is easily recognized, even by the amateur, has been reported from so many stations and is known to have so wide a distribution.

Is it not at least possible that some of its relatives are also widely distributed, but owing to the greater difficulty of their recognition, are not so widely recognized? It is hard for one whose views on "new species" are perhaps a little "cranky" to account otherwise for the facts, for instance, in regard to *L. seminuda*. This pretty species is abundant at Asheville, perhaps the most abundant species of *Lepiota*. Specimens and photographs have been seen by Bresadola who has verified the determination, and pronounced it correct in every detail. Still this species so far as I know is reported by only one collector, Prof. Morgan finding it at Preston. I greatly suspect that several of our new species will be found on further investigation to be referable to this abundant and variable species.

Lepiota rhacodes is a beautiful and striking species. As we found it it is large and robust, with a rounded almost hemispherical pileus, whose flesh is remarkably thick and firm, and which is covered with large strongly revolute scales, which render it very striking. It is at once recognized by the student of the group at first sight. The flesh and gills redden when bruised as in *L. Americana*, but the red color is not as bright and the change is slower. This species is doubtless rare in the United States. I have never seen anything even approaching it, though it has been found in New England. Cooke's figure is not good, but it will easily be recognized when found from the description.

Lepiota naucina was found only once, but then in some abundance in the parks at Stockholm. It is of course in outward appearance like our own *L. naucinoides*. The main point of interest was the form of the spores, as Fries stated that the spores of his species were round, which has led to the separation of our species in which the spores are elliptical and apiculate. Upon examination the spores were found to be identical with those of the American plant, and there can be no question that *L. naucina* as it is at present known to European mycologists is identical with *L. naucinoides*. It seems hardly probable that the traditional plant has been incorrectly determined. It is much easier to believe that the form of the spores was originally given incorrectly. The species is plentiful in Sweden and is, so far as I could learn, universally recognized as Fries' species.

L. cristata and *L. amianthina* need no comment. They were in agreement with the plants known by the same names with us.

The last species to appear at Drottningholm was an old friend, which is abundant at Asheville, and quite generally distributed in the U. S. It belongs to a group whose status is at present unsatisfactory, the *Clypeolariae*. Our species need further examination and comparison with well authenticated specimens of the European species before we shall be certain of their identity. The species found is known in Europe as *L. metulae-spora*. Fries considered it the same as Bulliard's species, *L. cly-*

peolaria, and so published it. Bulliard's plant is, however, different. It occurs in Sweden but is not as common and in spite of careful search I failed to find it. It is said to have a darker umbo and shorter spores than the true *L. metulaespora*. The plants we found were well marked by their soft appressed tomentose pileus, flocculose veil, and long spores. These were 15-20 x 5-6 mic., and were spindle shaped. The Asheville specimens have slightly shorter spores but agree in all other details with the Swedish plants. At Asheville there are three species of *Lepiota* belonging to this group, *L. metulaespora*, *floralis* and a third species upon which I am unwilling at present to express an opinion. Possibly it may prove to be the true *L. clypeolaria*, though it seems at present doubtful. *Lepiota floralis* occurs rarely in open sandy ground and seems to correspond well with Ravenel's plant, which was found in his garden from which he distributed at least three other new species, *L. oligosarcus*, *fulvaster*, and *psilopus*. These are all small species and from the specimens examined can not be well understood. I have examined two of Ravenel's specimens of *L. floralis*, one in very good preservation at Washington, the other in the herbarium at Baltimore. The spores in the latter were examined and were rather larger than the measurements given by Morgan, being 11-13 x 4-5 mic. and spindle shaped. It is worth suggesting that this species needs further investigation before its status can be considered satisfactory. The conditions under which it is found suggest very strongly that it is only a depauperate form of *L. metulaespora*. An almost unbroken series of forms can be found in this region connecting the two species, and the points of difference are such as may well be explained by the fact that one form is found in sheltered places in woods and the other in sterile sandy soil in open places.

NEW GENERA OF UREDINALES.

BY J. C. ARTHUR.

As the rusts are more carefully studied, and increased attention is given to the minute details of their structure, it becomes possible to find characters which enable one to group the species under genera that show relationship better than by the earlier method of using some obvious character to place many diverse forms under a few genera. The rusts are minute plants, and the diagnostic characters must be sought for with a corresponding minutia. In addition to the strictly morphological characters, the recognition of the invariable relation of the pycnia to the other spore-forms, by which it is possible to judge with much certainty of the nature of the life-cycle, has made it feasible to draw from

the whole set of spore-forms in assembling the characters held in common. In addition to these two sources of information regarding relationship sufficient knowledge of the whole body of *Uredinales* is now available so that some importance must be attached to the *pari passu* relationship of the host on which the fungus occurs.

In establishing the following genera these three points of view for determining relationship have been taken into account, *viz.*, morphological characters, life-cycle, and family of the host.

POLIOMA Arthur gen. nov.

Cycle of development includes pycnia and telia, both sub-epidermal.

Pycnia flask-shaped or globose, central cavity usually large, ostiolar filaments apparently wanting.

Telia erumpent, somewhat indefinite, without peridium or paraphyses; teliospores pedicelled, two-celled, wall very pale or colorless, homogeneous, smooth, one pore in each cell and apical. Spores usually germinate upon maturity.

Type species: *Puccinia nivea* Holw., on *Salvia purpurea* Cav. Genus related to *Eriosporangium*, but without as many spore-forms. The generic name is taken from the Greek for grayness, in allusion to the usual appearance of the telial sori.

Polioma nivea (Holw.) Arthur nom. nov.

Puccinia nivea Holway, Jour. Mycol. 11:158, 1905. On *Salvia purpurea* Cav., Oaxaca, Mex., Oct. 21, 1899, 3696, and Nov. 11, 1893, 5378, *E. W. D. Holway*

Polioma griseola (Lagerh.) Arthur nom. nov.

Puccinia griseola Lagerh., in Sydow, Monog. Ured. 1:296, 1902. On *Salvia* sp., Ecuador.

Polioma delicatula Arthur sp. nov.

O. Pycnia unknown.

III. Telia hypophyllous, scattered or somewhat confluent in compact groups, round, 0.3-0.4 mm. across, soon naked, pulvinate, dirty white, becoming cinereous by germination, ruptured epidermis not noticeable; teliospores oblong or lanceolate-oblong, rounded or obtuse at apex, 12-15 \times 40-48 μ , slightly or not constricted at septum, wall colorless, medium thin, 1-2 μ , not thickened above, smooth; pedicel hyaline, short.

On *Salvia elegans* Vahl., Sacred Mt., Amecameca, Mex., Oct. 20, 1903, *E. W. D. Holway*, 5200. Differs from *P. griseola* in the smaller spores without apical thickening.

SPIRECHINA Arthur sp. nov.

Cycle of development imperfectly known; only uredinia and telia recognized, both subepidermal, but judging from analogy also possessing subcuticular pycnia.

Uredinia erumpent, definite, without peridium or paraphyses; urediniospores borne singly on pedicels, ellipsoid, wall nearly colorless, echinulate-verrucose, pores obscure; contents colored.

Telia erumpent, definite, without peridium or paraphyses; teliospores borne singly on pedicels, obovate, one-celled, wall nearly or quite colorless, smooth, pore apical.

Spirechina Loeseneriana (P. Henn.) Arthur nom. nov.

Uredo Loeseneriana P. Henn. Hedwigia 37:273, 1898.

O. Pycnia unknown.

II. Uredinia amphigenous, often forming firm, more or less globular excrescences 3-20 mm. across, pulvinate, soon naked, pulverulent, bright orange-yellow fading to pale yellow, sometimes confluent, ruptured epidermis noticeable; urediniospores ellipsoid or obovate-oblong, 16-26 x 19-40 μ ; wall pale yellow, 1.5-2.5 μ thick, thicker above, 3-5 μ , echinulate-verrucose with rather fine tubercles closely set in spiral rows 2-3 μ apart, pores obscure.

III. Telia chiefly hypophyllous, scattered, small, 0.1-0.2 mm. across, soon naked, pulverulent, becoming pale yellow or whitish, ruptured epidermis not noticeable; teliospores narrowly obovate or oblong, 16-19 x 42-48 μ , usually germinating upon maturity; wall nearly or quite colorless, 1-1.5 μ thick, thicker above, 3-5 μ , smooth; pedicel colorless, short.

On *Rubus Bogotensis* H. B. K. Yungas, Bolivia, 1890, *A. Miquel Bang* 684 (type); *Rubus* sp., St. Catharine, Serra Geral, Brazil, January, 1891, *E. Ule* 1656; Jalambohoch, Dept. of Huehuetenango, Guatemala, August 22, 1896, *C. & E. Seler*, 2687 (type of *Uredo Loeseneriana*). The type specimen from South America was detected by the writer in the phanerogamic collection of the Field Museum in Chicago, upon sheet no. 77528. The spiral markings of the urediniospores naturally suggest the similar markings on the urediniospores of *Pileolaria*. The teliospores are in both cases one-celled. Yet these resemblances are doubtless superficial, and while they would consign both genera to the genus *Uromyces*, under the old system of single characters, the genus *Pileolaria* clearly shows affinities in the direction of *Ravenelia*, while *Spirechina* is closely related to *Kuehneola*, its chief difference being the one-celled teliospores. The generic name is taken from the Greek for *spiral* and *prickly husk*.

PROSPODIUM Arthur gen. nov.

Cycle of development includes pycnia, uredinia and telia, all subcuticular.

Pycnia hemispherical, hymenium flat, without ostiolar filaments.

Uredinia early naked, encircled by paraphyses; urediniospores borne singly on pedicels, wall colored, echinulate, often with a hygroscopic layer.

Telia erumpent, surrounded more or less by paraphyses; teliospores two-celled by transverse septum, wall colored, with a thin, hygroscopic, hyaline layer, sparsely papillose, pores one in each cell, apical in upper cell, near the pedicel in lower cell; pedicel refractive, usually appendaged.

Type species: *Puccinia appendiculata* Wint., on *Bignoniaceae*. This genus is related to *Uropyxis* by its subcuticular pycnia, encircling paraphyses in the uredinia, and hygroscopic layer of the teliospores, but differs in having only one pore in each cell of the teliospores.

Prosopodium appendiculatum (Wint.) Arthur nom. nov.

Puccinia appendiculata Wint. Flora 1884:262; *Puccinia ornata* Harkn. Proc. Calif. Acad. II, 2:231, 1889; *Puccinia medusaeoides* Arth., Bot. Gaz. 16:226, 1891; *Dicaeoma Stantis* Kuntze, Rev. Gen. Pl. 3:467, 1898; *Dicaeoma appendiculata* Kuntze, Rev. Gen. Pl. 3:467, 1898; *Puccinia Tecomae* Sacc. & Syd., Syll. Fung. 14:358, 1899. On *Stenolobium Stans* (L.) Don. (*Tecoma Stans* Juss., *T. sambucifolia* H. B. K.), Cuba, Mexico, South America.

Prosopodium Amphilophii (D. & H.) Arthur nom. nov.

Puccinia Amphilophii Diet. & Holw., Bot. Gaz. 24:30, 1897; *Puccinia phlyctopus* Syd., Monog. Ured. 1:242, 1902. On *Pithecoctenium hexagonum* DC. (not *Amphilophium*, as originally published), Mexico.

NEPHLYCTIS Arthur gen. nov.

Cycle of development includes pycnia and telia, both subcuticular.

Pycnia hemispherical, hymenium flat, without ostiolar filaments.

Telia erumpent, without peridium or paraphyses; teliospores two-celled by transverse septum, colored, with a usually obscure hygroscopic layer, sparsely papillose, pores one in each cell, apical in upper cell, near the pedicel in lower cell; pedicels without appendages.

Type species: *Puccinia elegans* Schroet., on *Tecoma Stans* Juss. Closely related to *Prosopodium*, but with fewer spore-forms, and short, unappendaged pedicels to the teliospores.

Nephlyctis elegans (Schroet.) Arthur nom. nov.

Puccinia elegans Schroet., Hennings in Hedw. 35:238, 1896.
On *Stenolobium Stans* (L.) Don (*Tecoma Stans* Juss.), Argentine, Brazil.

Nephlyctis transformans (E. & E.) Arthur nom. nov.

Puccinia transformans E. & E., Erythea 5:6, 1897; *Puccinia exitiosa* Syd. & Holw., Sydow Monog. Ured. 1:245, 1902.
On *Stenolobium Stans* (L.) Don, Lower California, Mex., Cuba, Bahama Islands. On *Stenolobium molle* (H. B. K.) Seem. (*Tecoma mollis* H. B. K.) Mexico.

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THE GENUS CORTINARIUS WITH KEY TO THE SPECIES.

BY C. H. KAUFFMAN.

The editor of the JOURNAL has asked me to furnish an account of the genus *Cortinarius* with *Key* to the species. What follows is given in response to this invitation. I desire to call attention to what was published in the *Bulletin of the Torrey Botanical Club*, based mainly on my study of the species found at Ithaca, N. Y. The cuts prepared for the illustration there have been kindly loaned for use here.

I quote from the same article the following:

"It is absolutely useless to pick up an old, dried specimen of *Cortinarius*, and ask any one to recognize it. Once in a while some easily known plant may be recognized in that way, but in the majority of cases old plants of different species look so much alike that it is mere guessing to say anything about them. The first thing to remember is that young, unexpanded plants must be examined as well as mature ones. Next a careful description must be made, *with special reference to the difference in the color of the gills in the young and old plants*. Then a similar comparison of the color of pileus and stem; and then a search for an annulus or universal veil, and its character. Finally, a careful test of the pileus and stem for gluten or viscosity. (One must remember that old, dry plants may lose this character.) These points are absolutely essential. In addition to the above, the following characters are often useful: the shape of the pileus; the size of the parts; the smoothness of the surface of pileus and stem; the character of the edge of the gills; the nature of the bulbous base of the stem; the appearance of the flesh. In fact, the notes can-

not be too full, *provided they contain the essential facts mentioned first.*" (*Bulletin of the Torrey Botanical Club.*)

THE KEY.

The key which is here presented is a revision, with many additions, of the key printed in the Bulletin of the Torrey Botanical Club, June, 1905. It is based on the study of fresh plants; but there have been added a few which the writer has not seen, but which have characters so easily recognized, and so different from others, that they were thought worthy of inclusion. This key, like its predecessor, necessarily has many shortcomings. As long as we are not sure what American plants are really identical with European ones, and so long as good figures or photographs of the species described for North America, are lacking, we are easily able to mistake the meanings of the descriptions, which are often of the very briefest. Hence this list is merely offered as a slight forward step towards opening up for amateurs the study of this interesting genus.

Six species, which the writer believes to be undescribed, have been included, although their descriptions have not yet been published. All of them have been collected or been received from various places more than once, and by inserting them in the key, we may be able to help those who continue to come across them. It is hoped soon to publish descriptions of them elsewhere.

It is to be noted that the key has been built largely on the size of the spores. This will necessitate, it is hoped, the study of the plant under the microscope, and so initiate the beginner at once into the proper study of these fungi. We know that two different species of mushrooms have again and again been placed under one name because of similar external appearances, when an examination of the spores would have shown a difference of as much as 8 microns in some cases. In deciding on the size of spores, the measurement of mature spores only should be taken, which may be recognized by the dark wall or the roughness of the exospore; even in plants with yellowish spores a difference between young and mature spores can be made out.

KEY TO THE COMMON SPECIES OF CORTINARIUS OF EASTERN
NORTH AMERICA.

- A. Pileus with a gelatinous cuticle, more or less viscid or glutinous when moist, as is also the stem in some species. [Myxaciium and Phlegmacium.]
- a. Pileus coarsely corrugate.....*C. corrugatus* Pk.

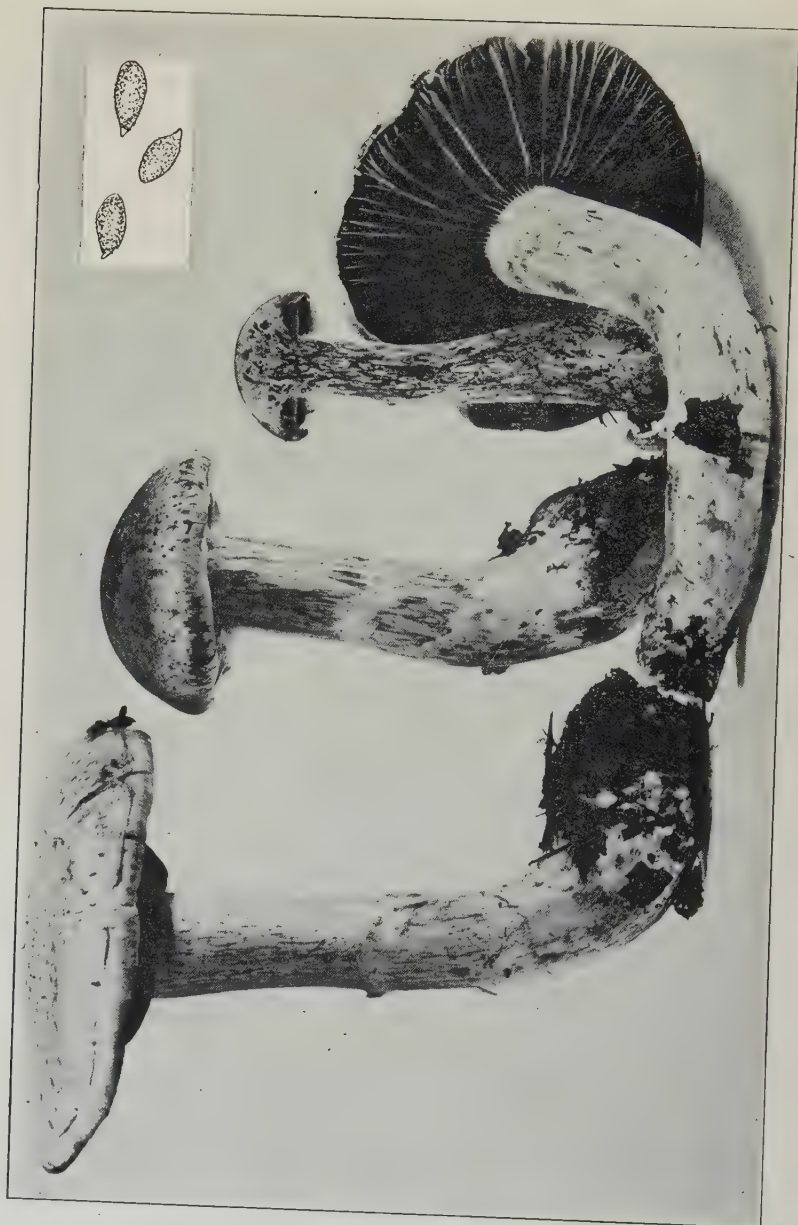
- aa. Pileus not coarsely corrugate
 - b. Surface of pileus or flesh distinctly bitter
 - c. Pileus yellow
 - d. Glutinous when young, very bitter; stem white.
 - C. amarus* Pk.
 - C. vibratilis* Fr.
 - dd. Not glutinous; stem and gills citron yellow; flesh rather bitter; spores $14-17 \times 7-9\mu$
 - C. turbinoides* sp. nov.
 - cc. Pileus dark olivaceous to fuliginous, surface bitter*C. infractus* Fr.
 - bb. Taste not distinctly bitter
 - c. Spores large, $9-16\mu$ long
 - d. Stem short, subequal or marginate-bulbous; spores $9-12\mu$ long.
 - e. Pileus heliotrope-purple; gills close, narrow and concolor; plant medium size. ...*C. heliotropicus* Pk.
 - ee. Pileus some shade of yellow or greenish
 - f. Gills whitish at first; pileus tinged greenish; stem not bulbous*C. olivaceo-stramineus* Kauff.
 - ff. Gills yellow to yellowish at first; stem marginate-bulbous
 - g. Bulb top-shaped; gills entire; flesh white. .*C. turbinatus* Fr.
 - gg. Bulb truncate below; gills eroded, flesh yellow; whole plant citron-yellow*C. sulfurinus* Quel.
 - eee. Pileus whitish, no greenish tinge
 - f. Stem marginate-bulbous; plant whitish throughout
 - C. albidus* Pk.
 - ff. Stem equal or subequal; pileus whitish or tinged red,
 - C. communis* Pk.
 - dd. Stem long and bulbous; gills and stem violaceous at first
 - e. Spores $10-12.5\mu$ long; pileus pale brown; on sphagnum*C. sphagnophilus* Pk.
 - ee. Spores $13-16\mu$ long; pileus yellow; in woods....
 - C. Atkinsonianus* Kauff.
 - ddd. Stem not bulbous, long and cylindrical, plant more or less glutinous
 - e. Stem with evanescent, patch-like scales
 - f. Gills pallid at first.....*C. elatior pallidifolius* Pk.
 - ff. Gills violaceous at first.....*C. cylindripes* Kauff.
 - ee. Stem with broken, concentric rings of floccose scales, usually somewhat narrowed at base.....*C. collinitus*. Fr.
 - cc. Spores smaller, $6-9\mu$ long
 - d. Pileus olivaceous; stem bulbous

- e. Universal veil present; spores $8-9\mu$ long.....
C. olivaceodes sp. nov.
- ee. No remains of a universal veil; spores $6-7\mu$ long....
C. olivaceus Pk.
- dd. *Pileus violaceous or purple, or at least tinged violaceous*
- e. *Pileus glutinous when young and moist*
 - f. Stem marginate-bulbous; gills very narrow and crowded; whole plant violaceous, large
C. Michiganensis sp. nov.
 - ff. Stem subequal or clavate; gills subdistant, adnate; whole plant violaceous-purple, medium size.....
C. iodes B. & C.
- ee. *Pileus not glutinous*
 - f. Flesh and gills turning purple when bruised.....
C. purpurascens Fr.
 - ff. Flesh not turning purple
 - g. Stem marginate-bulbous; pileus yellowish or brownish, tinged violaceous; medium size.....
C. coerulescens Fr.
 - gg. Stem not marginate-bulbous
 - h. Pileus yellow; gills violaceous to cinnamon; stem white with violaceous apex.....
C. Berlesianus Sacc. & Cub.
(Syn. = *C. tricolor* Pk.)
 - hh. Pileus and gills lilac; plant small.....
C. croceo-coerulius (Pers.) Fr.
 - ddd. *Pileus with neither olivaceous nor violaceous tints (except the first)*
- e. *Pileus glutinous*
 - f. Gills olivaceous; pileus brownish-ochraceous.....
C. glutinosus Pk.
 - ff. Gills whitish at first
 - g. Pileus bay-red.....*C. maculipes* Pk.
 - gg. Pileus pale ochraceous, spores globose
C. spherosporus Pk.
 - fff. Gills violaceous at first, spores as in preceding
C. delibutus Fr.
- ee. *Pileus not glutinous*
 - f. Stem marginate-bulbous
 - g. Gills at first whitish.....*C. multiformis* Fr.
 - gg. Gills at first blue.....*C. glaucopus* Fr.
 - ggg. Gills at first yellow...*C. fulgens* (Alb. & Schw.)
 - ff. Stem not marginate-bulbous, clavate to subequal
 - g. Gills and stem pallid at first, soon tinged brown
 - h. Pileus watery-cinnamon to brick-red on disk; in woods*C. glabrellus* sp. nov.

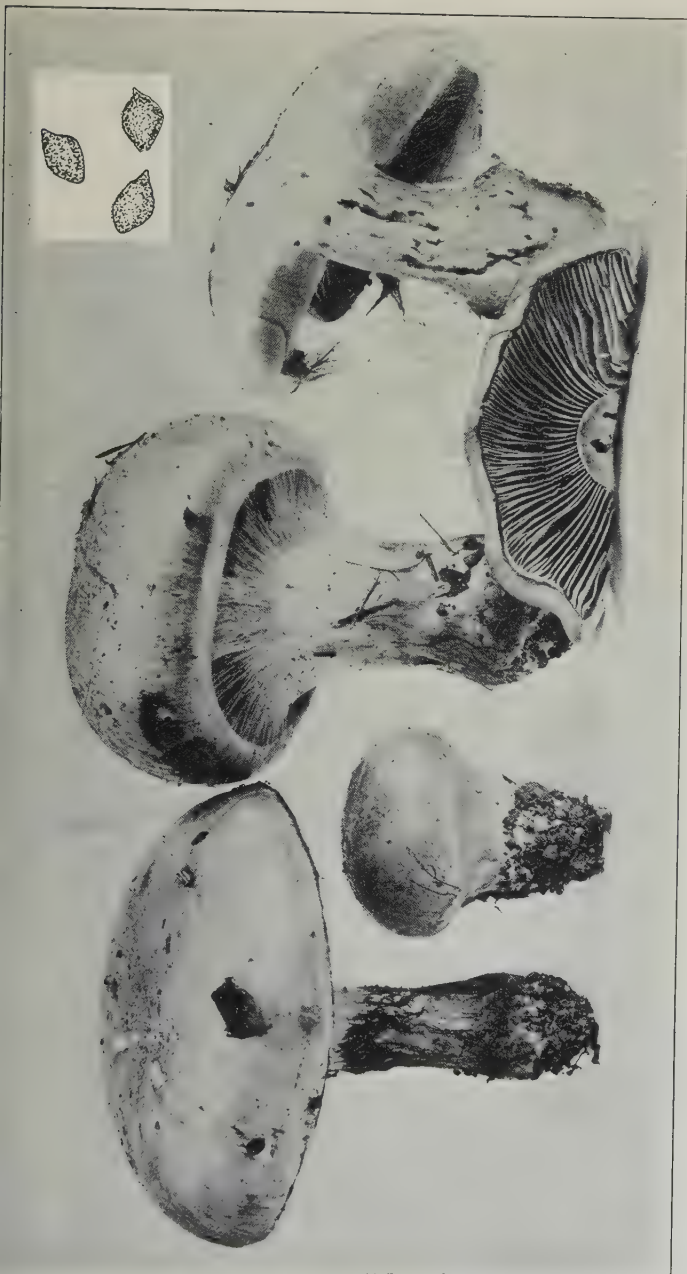
- hh. Pileus whitish to pale clay-color; in mushroom and flower-beds.....*C. intrusus* Pk.
- gg. Gills and apex of stem violaceous at first, soon brownish*C. lanatipes* Pk.
- ggg. Gills and pileus drab-gray; viscid universal veil present*C. sterilis* Kauff.
- B. Cuticle of pileus not composed of gelatinous cells, hence never viscid nor gelatinous. [Inoloma, Talamonia, Dermocybe, and Hydrocybe.]**
 - a. Spores 12-16 μ long
 - b. Pileus rather large, squamulose; whole plant dark violaceous*C. violaceus* Fr.
 - bb. Pileus small, chestnut color; stem white; spores 16 x 11 μ *C. sericipes* Pk.
 - aa. Spores 10-12 μ long
 - b. Plants small, 2-4 cm. tall
 - c. Pileus hygrophanous, glabrous, bay-red (moist); gills subochraceous*C. badius* Pk.
 - cc. Pileus not hygrophanous, densely fibrillose; gills yellow.....*C. aureifolius* Pk.
 - bb. Plants larger
 - c. Stem distinctly sheathed or ringed by the universal veil
 - d. Pileus tawny; stem with cinnabar-colored, persistent, concentric rings.....
C. armillatus (Alb. & Schw.)
 - dd. Pileus purplish-brown, copper-brown, etc., to drab; stem peronate, i. e., sheathed with a universal veil.....*C. torvus* Fr.
C. torvus nobilis Pk.
 - ddd. Pileus tinged yellow or rufous; stem peronate and annulate by a white universal veil...
C. canescens Pk.
 - cc. Stem not sheathed or ringed; the universal veil evanescent or absent
 - d. Pileus hygrophanous, fibrillose-squamulose (like *C. paleaceus*)
 - e. Pileus dingy chestnut (moist); stem long and slender..
C. gracilis Pk.
 - ee. Pileus grayish; stem stout and short, bulbous.....
C. griseus Pk.
 - dd. Pileus not hygrophanous, merely silky or innately fibrillose
 - e. Pileus reddish-gray, tinged purplish; gills purple or violaceous; spores 10-12 μ long....*C. pulchrifolius* Pk.
C. rubrocinerens Pk.



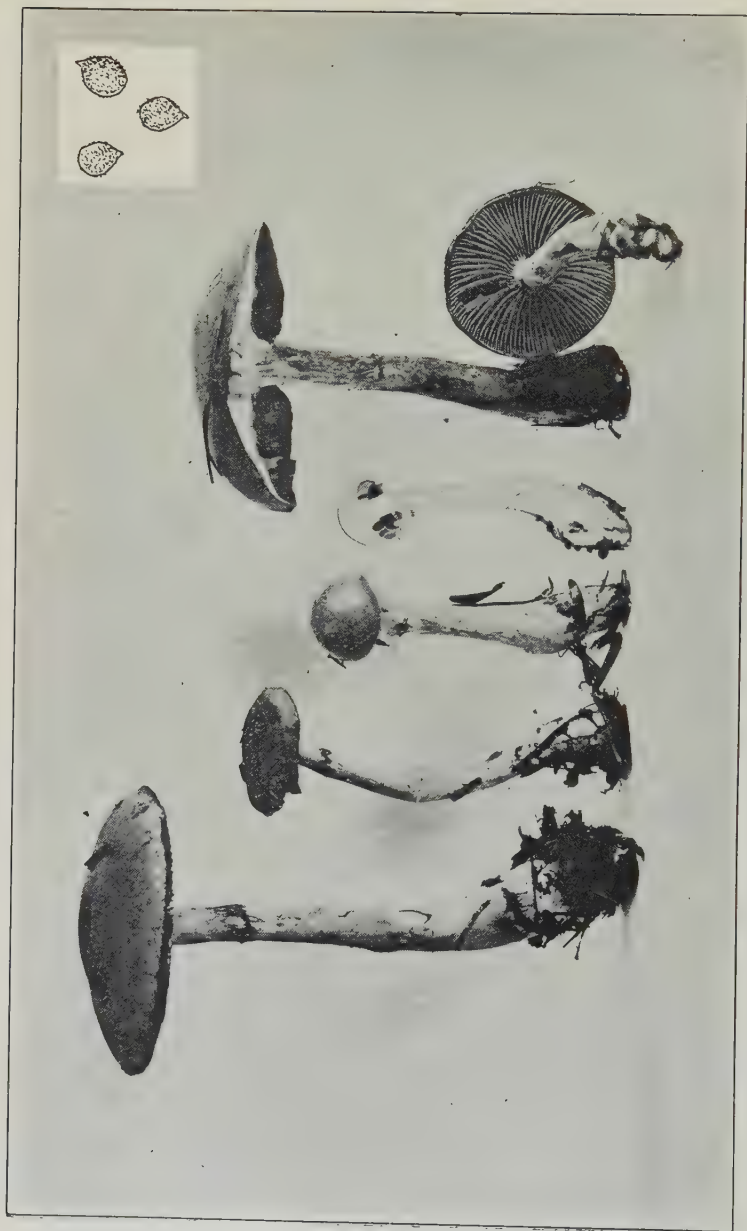
CORTINARIUS CROCEOCOLOR KAUFF. (From Bull. Torr. Bot. Club.)



CORTINARIUS UMIDICOLA KAUFF. (From Bull. Terr. Bot. Cl.)



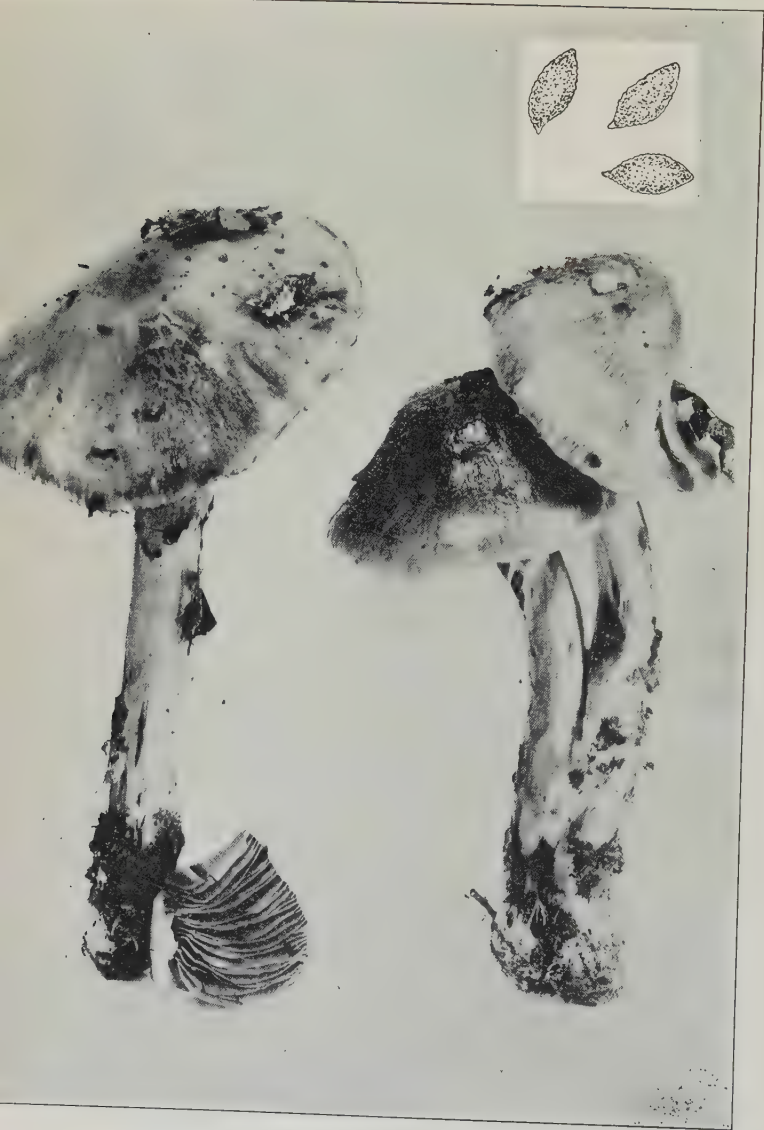
CORTINARIUS OLIVACEO-STRAMINEUS KAUFF. (From Bull. Torr. Bot. Club.)



CORTINARIUS STERILIS KAUFF. (From Bull. Torr. Bot. Club.)



CORTINARIUS CINNAMOMEUS (L.) FR. (From Bull. Torr. Bot. Club.)



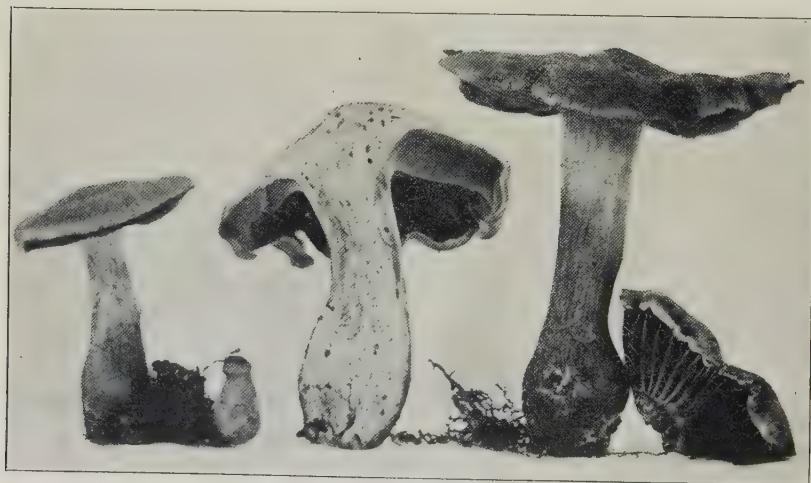
CORTINARIUS CYLINDRIPES KAUFF. (From Bull, Torr, Bot. Club.)



CORTINARIUS ATKINSONIANUS KAUFF. (From Bull. Torr. Bot. Club.)



CORTINARIUS DECEPTIVUS KAUFF. (From Bull. Torr. Bot. Club.)



CORTINARIUS RUBRIPES KAUFF. Reduced. (From Bull. Torr. Bot. Club.)

- ee. Pileus, stem and gills lilac; spores $9-10\mu$
C. lilacinus Pk.
- eee. Pileus, stem and gills violaceous at first; spores $10-12\mu$ long.....*C. rimosus* Pk.
- aaa. Spores $4-9\mu$ long; if longer, plants are whitish or violaceous
 - b. Stem and pileus scaly or shreddy
 - c. Scales red (scarlet to vermillion)....*C. bolaris* Fr.
 - cc. Scales brown to blackish
 - d. Plant large, watery-spongy, soon dark chocolate colored*C. squammulosus* Pk.
 - dd. Plants of medium size, wood-brown.....*C. pholideus* Fr.
 - bb. Stem not scaly.
 - c. Stem with more or less persistent annular rings, or peronate
 - d. Plants large, 2-8 cm. or more tall; pileus in proportion
- e. Pileus watery-cinnamon (moist); gills very distant.....
C. distans Pk.
- ee. Pileus buff, ochraceous, clay-colored or tawny
 - f. Gills at first yellow or yellowish
 - g. Pileus at first buff; stem peronate by the thin universal veil.....*C. flavifolius* Pk.
 - gg. Pileus ochraceous to ferruginous; subannulate..
C. Morrisii Pk.
 - ggg. Pileus at first tawny-yellow, with pointed squamules on disk; peronate by tawny-yellow universal veil*C. annulatus* Pk.
 - ff. Gills at first brownish or ochraceous; pileus rufous-ochraceous
 - g. Spores elliptical.....*C. bivelus* Fr.
 - gg. Spores spherical, minute, $4-5\mu$ diameter.....
C. subbivelus sp. nov.
- eee. Entire plant saffron-yellow.....*C. croceocolor* Kauff.
- eeee. Pileus some shade of blue or purple when young, buff to tan when old
 - f. Plants stout, umber-purple to buff; pileus punctuate in or near swamps, in large troops....*C. umidicola* Kauff.
 - ff. Mature plants rather slender; pileus fawn-colored, tinged lavender when young, not punctate; common in hemlock woods.....*C. deceptivus* Kauff.
 - dd. Plants small, subannulate; pileus less than 3-4 cm broad
- e. Pileus fuscous, covered with white villose fibrils.....
C. paleaceus (Weinm.) Fr.

- ee. Pileus not villose-squamulose, cinnamon to chestnut color
 - f. Gills and stem violaceous at first... *C. subflexipes* Pk.
 - ff. Gills and stem pallid to brownish
 - g. On rotten wood; pileus watery cinnamon....
C. lignarius Pk.
 - gg. On ground or moss; pileus bay to chestnut brown; annulus often distinct.....
C. castaneoides Pk.
 - cc. Stem with no annulus, or annulus evanescent
 - d. Stem bulbous or clavate
- e. Bulb depressed-marginate; gills heliotrope purple when young..... *C. obliquus* Pk.
- ee. Bulb clavate to subclavate
 - f. Color of plant lilac to violaceous-white
 - g. Plants of medium size, violet tinge evanescent, never yellowish *C. alboriolaceus* (Pers.) Fr.
 - gg. Plants medium to large, lilac tinge persistent....
C. lilacinus Pk.
 - ggg. Plants medium to small, violaceous to cinereous, tinged yellow or brown..... *C. simulans* Pk.
 - ff. Color of plant deep chrome, unchanging.....
C. callisteus Fr.
 - fff. Color of plant watery-cinnamon or rufous-cinnamon (moist)
 - g. Stem whitish, pileus rufous-cinnamon to tan; not hygrophanous..... *C. subsalmoneus* sp. nov.
 - gg. Stem red; pileus hygrophanous, pinkish-ochraceous (dry) *C. rubripes* Kauff.
 - dd. Stem subequal or tapering downward
- e. Pileus distinctly hygrophanous
 - f. Plant small; pileus 2 cm. broad or less
 - g. Gills and stem violaceous when young
 - h. Stem stout, smooth; spores 7-9 μ long.....
C. castaneus (Bull.) Fr.
 - hh. Stem slender; spores 6-7 μ long
 - i. Gills and stem pale reddish violaceous at first; pileus blackish-brown; in woods..
C. subflexipes Pk.
 - ii. Gills dark-violaceous at first; pileus fuscous, tinged violaceous; on sphagnum...
C. fuscoviolaceus Pk.
 - gg. Gills ochraceous, pale; stem whitish, not slender..
C. pulcher Pk.
 - ff. Pileus broader than 2 cm.
 - g. Pileus tawny orange to cinnamon; stem pale.....
C. armeniacus (Schaeff.) Fr.
 - gg. Pileus watery-cinnamon; gills very distant.....
C. distans Pk.

- ggg. Pileus and stem pale lavender; stem long and attenuated *C. everneus* Fr.
- ee. Pileus not hygrophanous
- f. Pileus chestnut or cinnamon color
- g. Stem whitish, soon dingy to brownish.....
C. castanellus Pk.
- gg. Stem yellow, no olivaceous tinge
- h. Gills at first yellow.. *C. cinnamomeus* (L.) Fr.
- hh. Gills at first flame scarlet.....
C. semisanguineus flamineus Kauff.
- hhh. Gills at first dark blood-red.....
C. semisanguineus Fr.
- ff. Pileus tawny-olive; stem yellow, tinged olivaceous....
C. croceus Fr.
- fff. Pileus and stem scarlet or blood red
- g. Pileus broad as compared with the rather short stem; spores $8 \times 5\mu$ *C. cinnabarinus* Fr.
- gg. Pileus narrow; stem longer; spores $6 \times 4\mu$
C. sanguineus (Wulf) Fr.

Univ of Michigan.

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EDITOR'S NOTES.

This No. of the Journal is issued somewhat earlier and the size is less than usual, on account of the editor's contemplated trip to Guatemala. The next No. may be correspondingly delayed by his prolonged absence. We regret also that no account can at present be given of the mycological papers presented at the New York Meeting of the A. A. A. S. and affiliated societies.

In this No. we are concluding the installments of Professor Morgan's monograph of the North American species of *Lepiota*. The parts will be reprinted as a single pamphlet. This then, as well as the North American species of *Marasmius*, by the same author, will we are sure be welcomed by very many botanists. Those interesting special groups can now be observed and studied systematically and advantageously — scarcely the case when the literature pertaining to many of the species remained practically inaccessible except perhaps to the specialist himself.

As serving a similar purpose and likewise of special advantage to the student of mycology — therefore it can be placed in the same category, namely, the article we are giving this month by Mr. Kauffman of the University of Michigan. His excellent work on the species of *Cortinarius*, to which difficult and important group he is still devoting himself, will be keenly appreciated by those interested in the Agarics. To the numerous other contributors in the past we are equally grateful for important articles — all of which in fact can justly be claimed as creditable to American mycology.

The Journal has set for itself the aim to index and in a measure to represent the work of our mycologists — and incidentally to give by brief notes some idea of the work in the entire mycological world. In our scope we include monographic articles of lesser or greater extent — and we expect to present from time to time much work of the latter character.

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